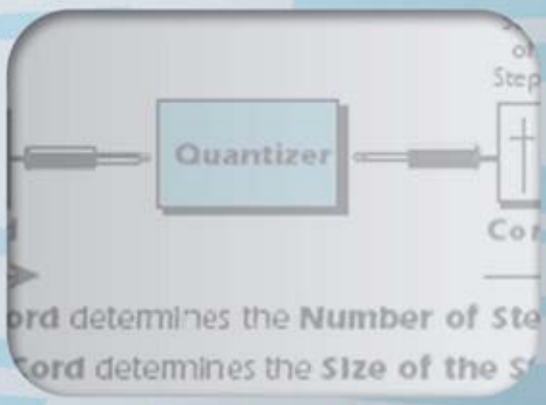
EmulatorX3
STREAMING SAMPLING SYNTHESIZER

ProteusX2
SOFTWARE SOUND MODULE

Advanced Applications Guide

Getting Around

Intermediate Lessons



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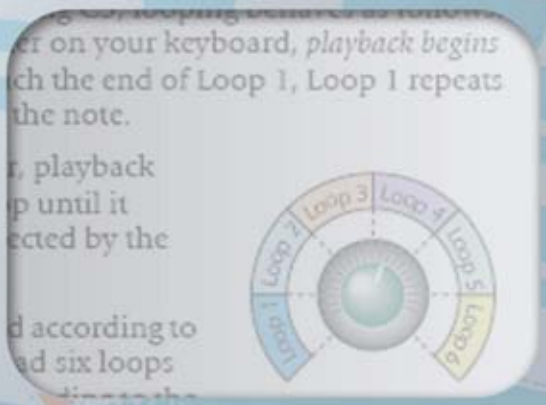
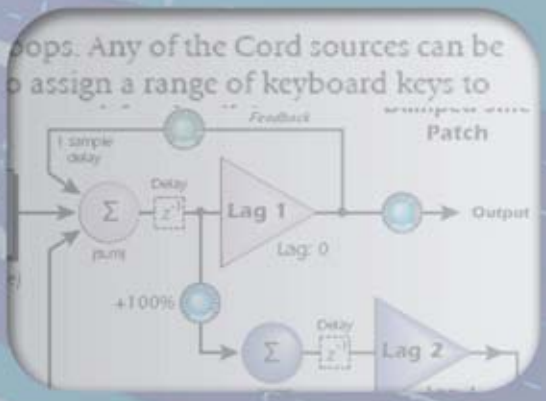


Advanced Applications



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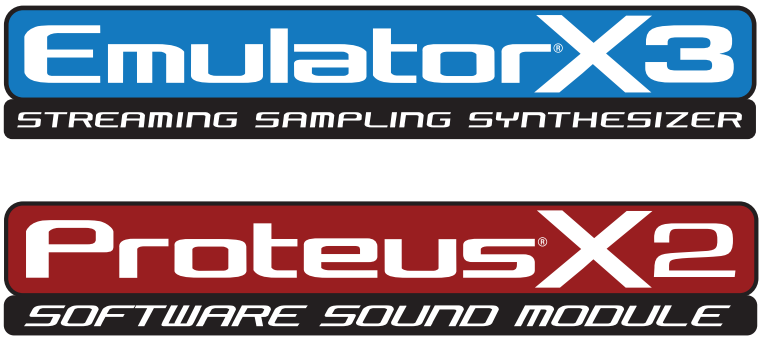

Advanced Applications Guide

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Version 1.2
For Emulator X, Emulator X2, Emulator X3, Proteus X, and Proteus X2

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Introduction

Welcome to the Proteus X /Emulator X Advanced Applications Guide!

The Emulator X and Proteus X are audio toolboxes with incredible sonic capabilities. These amazing tools allow you to sample ANY sound and then easily manipulate it to create a custom musical instrument.

The Emulator X and Proteus X, like all musical instruments, have a learning curve. However, this guide was designed to make the learning curve as easy and painless as possible. Once you get over the hump, you'll be able to create your own custom instruments and banks with ease.

Once you feel comfortable with the basics in chapters 1-3, feel free to browse though the remaining 40 lessons. The lessons are numbered in order of increasing complexity. Some lessons actually expand the boundaries of normal synthesis, and may provide you with some new ideas that you can incorporate into your music.

Each lesson contains many useful shortcuts and tricks that you might not otherwise discover, and if you make it through all the lessons you'll be a certified sampling master! There *are* a few oddball applications, which we included to demonstrate how new features can be invented using the power of your imagination.

Oftentimes a new sound or effect serves to stimulate the imagination and the idea for a new song is born. With Proteus X and Emulator X you can become an instrument designer, as well as being a musician and performer.

The Proteus X and Emulator X Icons

At the beginning of each lesson you'll see one or both of these colored icons. Because the Proteus X feature set is a subset of the Emulator X, these icons indicate whether the lesson is relevant to the Emulator X or for both products.

Fundamentals

If you're new to the Emulator X or Proteus X, this entire chapter will be extremely useful. By all means, we encourage you to actually program the Emulator X / Proteus X as you read. This is the best way to learn and remember how everything works.

You might want to give this chapter a quick scan even if you are familiar with the system as there are little tidbits of information scattered throughout.

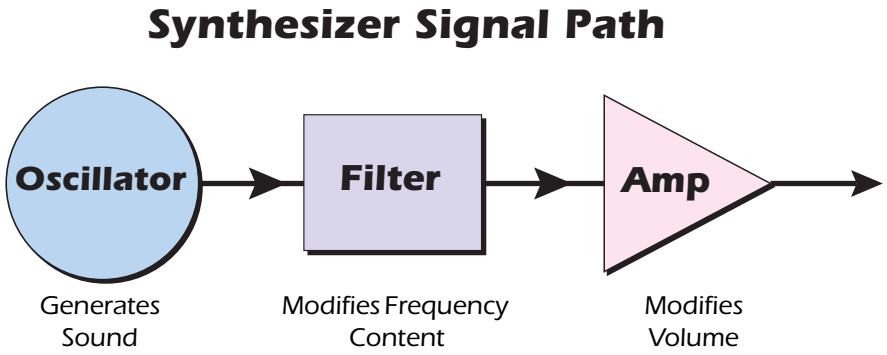
Lesson 1 is a short review of synthesizer basics and explains the basic organization of the Emulator X and Proteus X. This short three page review is the only lesson in the book where you won't be programming as you read.

Lesson 2 helps you get your MIDI continuous controllers programmed to your MIDI keyboard.

Lesson 3 walks you through the process of creating an entire preset from scratch. When you finish this chapter, you'll be well on your way to mastering the Proteus X/Emulator X.

1 *Basics: The Signal Flow of Emulator and Proteus X*

The Emulator X and Proteus X have a fixed signal path following the basic synthesizer model used since the Minimoog. This model consists of three basic building blocks: Oscillator -> Filter -> Amplifier.



Oscillator (samples)

The oscillator generates the actual sound of a synthesizer. The oscillator's pitch is usually controlled by a keyboard (as well as other devices, which we'll get to later). In a traditional synthesizer, the oscillators generate a limited number of simple waveforms.

In the Emulator X and Proteus X, the oscillators have been replaced by *Samples*, or digital recordings. Unlike a traditional oscillator, samples can be any sound and any length. Samples can also be looped, so that any part of the recording can play indefinitely.

Filter

The filter modifies the sound by subtracting or accentuating certain frequencies. The tone control on your home stereo is an example of a simple filter. A synthesizer filter has much more sound shaping ability and can be manipulated over time in complex ways by the special control devices in the synthesizer. The filter may also be referred to as a VCF *(for the Voltage Controlled Filter on an analog synthesizer from which it is based)*.

The Emulator X/Proteus X contains over 50 different filter types. Some of these are traditional synthesizer filters such as Lowpass, Highpass or Bandpass filters. Lowpass filters *let the low frequencies pass.* Highpass filters *let the high frequencies pass*. Bandpass filters—you guessed it—*let a specific band of frequencies pass*.

The Emulator X/Proteus X also features a special type of filter called a *morphing filter.* Morphing filters are able to change their function over time. For example, a lowpass filter could change into a highpass filter during the course of a note.

Amplifier

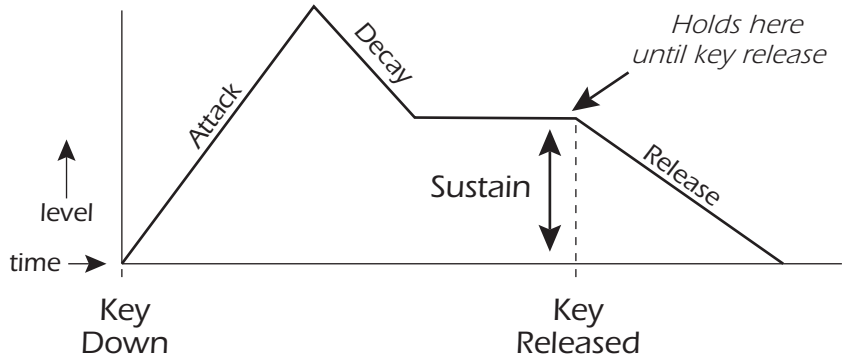
The last audio building block is the amplifier. The amplifier shapes the volume contour of the sound over time. The amplifier may also be called a VCA *(for Voltage Controlled Amplifier on older analog synths)*, or DCA *(for Digitally Controlled Amplifier on newer digital synths)*.

Every sound has a characteristic volume curve that changes over time. Some sounds are percussive, such as a drum, a piano or a hand clap. Other sounds start slowly and build, such as a violin or a plane flying overhead. The device in a synthesizer that generates the volume *curve* is called an envelope generator.

Envelope Generator

An envelope can be described as a "contour" which can be used to shape the sound in some way over time. Think of an envelope generator as a device that automatically controls a parameter (such as volume) when a key is pressed. This would be like manually turning the volume control up and down when you press a key to create a certain effect. The envelope generator is programmed to do this automatically and in a repeatable way.

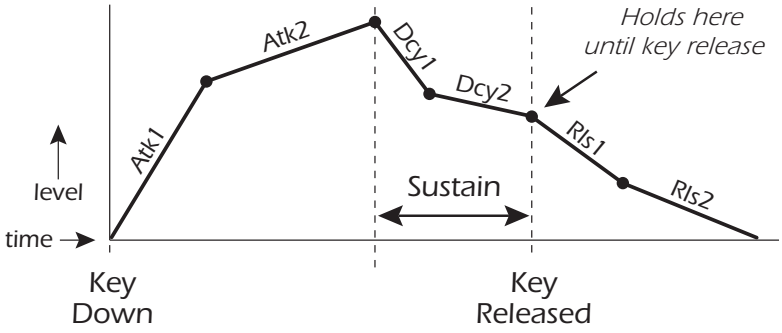
The traditional envelope generator contains four parts: Attack, Decay, Sustain, and Release, and is commonly known as an ADSR.



When controlling the Amplifier (volume) the ADSR works like this:

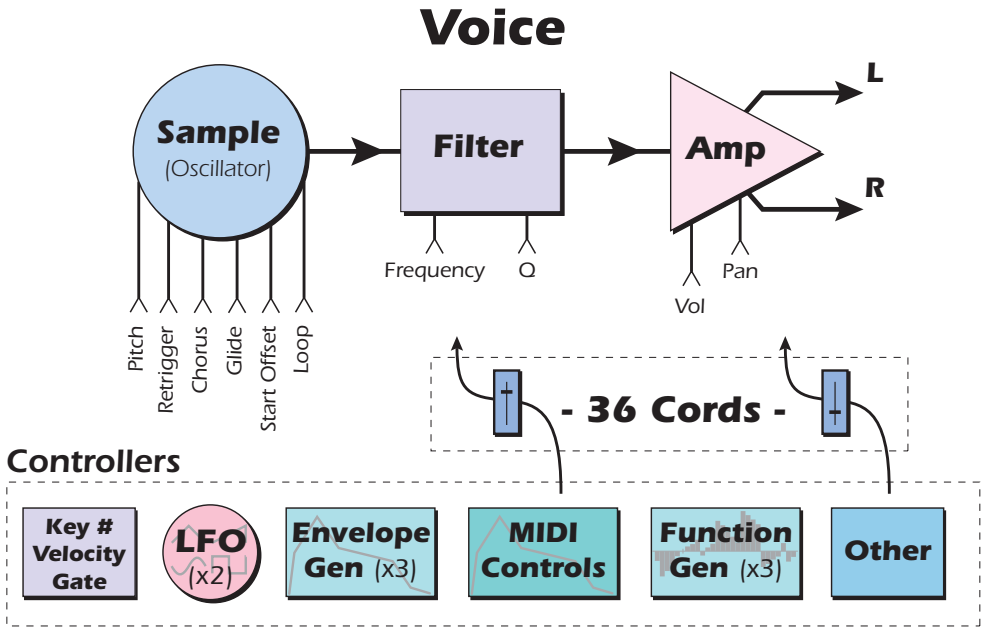
- **Attack** - Controls the time it takes the sound to reach maximum level.
- **Decay** - After reaching maximum level, the sound decays to the Sustain level at this rate.
- **Sustain** - The volume remains at this level as long as the key is held.
- **Release** - When the key is released, the volume decays to zero at this rate.

The Emulator X/Proteus X envelope generators are just like standard ADSR's, except that they have two segments for each stage: a time and a level.



This is how the rate/level envelopes work: When a key is pressed, the envelope starts from zero and moves toward the Attack 1 Level at the Attack 1 Rate. As soon as it reaches this first stage, it immediately begins the Attack 2 phase and moves toward the Attack 2 level at the Attack 2 rate. As long as the key is still held, the envelope continues on through the Decay 1 and Decay 2 stages. If the key is still held when the envelope reaches the end of Decay 2, it simply stops and waits for you to release the key. When you release the key, the envelope continues through its Release 1 and Release 2 stages, returning to zero at the end of the Release 2 stage. The rate/level envelopes give maximum flexibility to program both complex and simple envelopes.

The envelopes and other controllers are connected to the sound processing blocks using software Cords. Cords have a built-in bipolar amount control. (No, they're not schizophrenic!) The amount goes from -100 to +100. If the amount is negative, the control signal is inverted. The Cords provide tremendous flexibility because they allow almost any possible connection between the various control and processing modules.



So there you have it! There are three basic sound processing modules: **Oscillator**, **Filter** and **Amplifier**. The **Envelope Generators** and other controllers are connected to the processing modules using **Cords**, which have a built-in amount control.

An oscillator can be ANY sound. Samples are imported or recorded, then shaped using the various filter types and the amplifier using the envelopes and other controls. The possibilities are truly staggering!

In creating a synthesizer sound you become an instrument builder. Your job as builder is to combine the various elements together and add various types of control so that the instrument responds in a musically satisfying way. So let's continue now and build a preset completely from scratch.

2 *Assigning Continuous Controllers*

Before we go any further, lets route the Controller Knobs on your MIDI keyboard to control the Proteus X /Emulator X. We're assuming that your keyboard has controller knobs and that it is connected to the Proteus X / Emulator X and plays notes.

Check out the Situation

1. Start by loading any bank. The main preset selection window appears with the 16 controllers shown.

2. Turn the knobs on your keyboard. Do any the knobs on the Proteus X / Emulator X move in unison? If so, your keyboard knobs are correctly assigned. If the screen knobs don't move or they don't control the knobs they way you want, read on.

The Way Continuous Controllers (CCs) Work

Most of the MIDI gear today is so flexible that it actually makes things more complicated than it need be. Continuous controller assignment is a good example of this.

When you turn a knob on your keyboard, it sends a continuous controller (CC) message on a **specific CC channel** that tells the receiving device (the synthesizer) that the knob moved to a new value. Each knob on your keyboard has to have its own CC channel, otherwise all the knobs would control the same parameter.

The confusion comes in because the BOTH the keyboard and the Proteus X / Emulator X can freely assign knobs to ANY of the CC channel numbers. **In order for the keyboard and synth to link up correctly, the channel numbers of the controllers on BOTH DEVICES MUST MATCH.**

1. **Each Knob on your Keyboard sends is assigned a CC number.**

Preferences
(Options, Preferences Controllers)

2. **Set the CC numbers to match those of your MIDI Keyboard.**

The way a keyboard assigns its knobs to CC channels depends on the brand of keyboard. In order to get the two units talking to each other you'll have to either:

a. change the controller numbers that your keyboard sends to match the Proteus X / Emulator X, or...

b. change the controller numbers that the Proteus X / Emulator X receives.

We can tell you how to change the CC channels on the Proteus X or Emulator X, BUT you still have to know what CC channels your keyboard is transmitting.

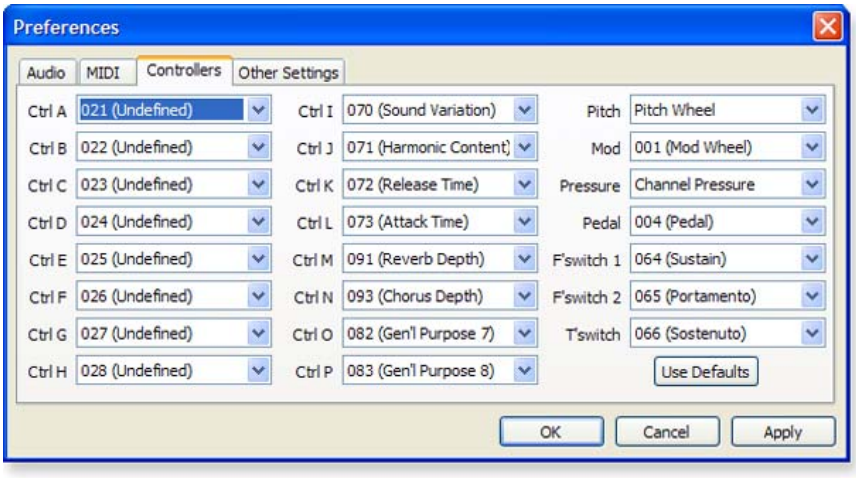
To Program your Keyboard to Match the Proteus X or Emulator X

1. Change the controller numbers for the knobs on your keyboard so they match the numbers in the Proteus X / Emulator X screen shown below.
2. Try out the knobs as described in steps 1 and 2. If they now work, you're all finished. If the keyboard works but not the knobs, you still have a CC number mismatch. Try again.

To Program the Proteus X / Emulator X to Match Your Keyboard

If your keyboard knobs are already working properly with other software or synths, you'll probably want to change the Proteus X / Emulator X controllers to match your keyboard. Here's how.

1. Find out the CC channel of each knob on your keyboard. You may want to write these down.
2. On the Proteus X / Emulator X, select **Preferences** from the **Options** dialog box. The preferences dialog box is divided into four main groups. Click on the **Controllers** tab heading. The screen shown below appears.



3. The default controllers settings for the Proteus X or Emulator X are shown above. *(Pressing the Use Defaults button resets these settings.)* The screen sets up which MIDI Continuous Controllers Proteus X /Emulator X will

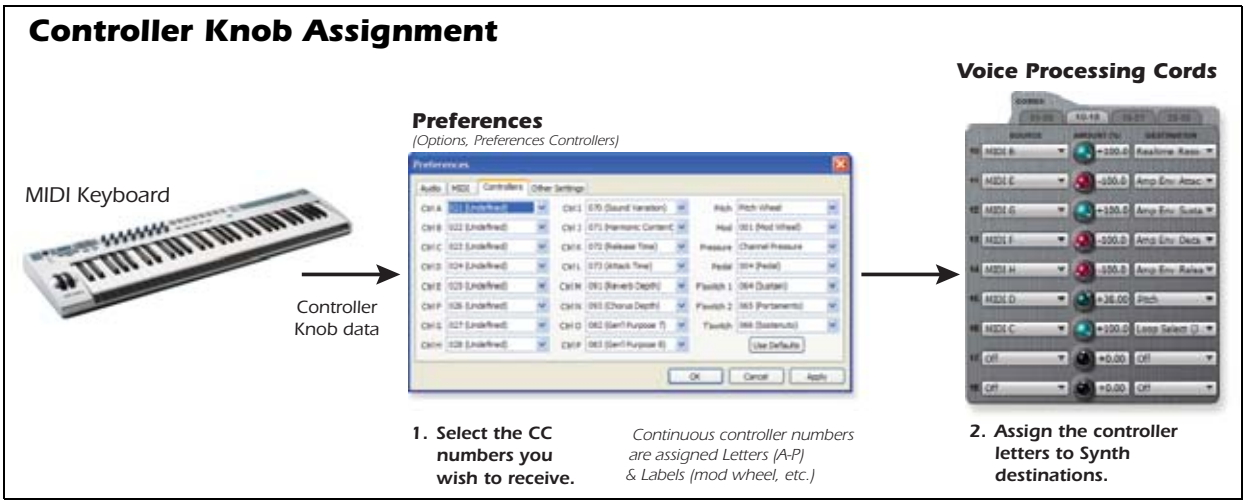
receive.Match these controls to the MIDI continuous controller numbers that your keyboard transmits.

4. **Click OK** to close the Preferences.
5. Try out the knobs as described in steps 1 and 2. If they now work, you're all finished. If the keyboard plays notes, but the knobs still don't change the on-screen knob positions, you still have a CC number mismatch.

More Information About Proteus X / Emulator X CC Numbers

You might have noticed that MIDI Continuous Controller numbers are assigned to letters (A-P) or labels (Pitch, Mod, Pressure, Pedal, etc.) in the Controller Preferences screen.

When programming the Proteus X / Emulator X, these letter or name labels can be assigned to control various parameters such as filter frequency or attack time. If you're using the Factory Sound Banks, the knob programming is done for you. Now that you have your knobs connected, you can start playing.


Controller Knob Assignment
Voice Processing Cords
Preferences
(Options, Preferences Controllers)
MIDI Keyboard
Controller Knob data
1. Select the CC numbers you wish to receive.
Continuous controller numbers are assigned Letters (A-P) & Labels (mod wheel, etc.)
2. Assign the controller letters to Synth destinations.

The Controllers screen determines which CC numbers (knob controller data) the Emulator X will receive. What the knobs actually do to change the sound can be programmed differently for each preset (Voice Processing).

3 Building a Preset from the Ground Up

In this tutorial we're going to start with an empty bank and create a complete preset using some of the samples in your library. Along the way you'll learn:

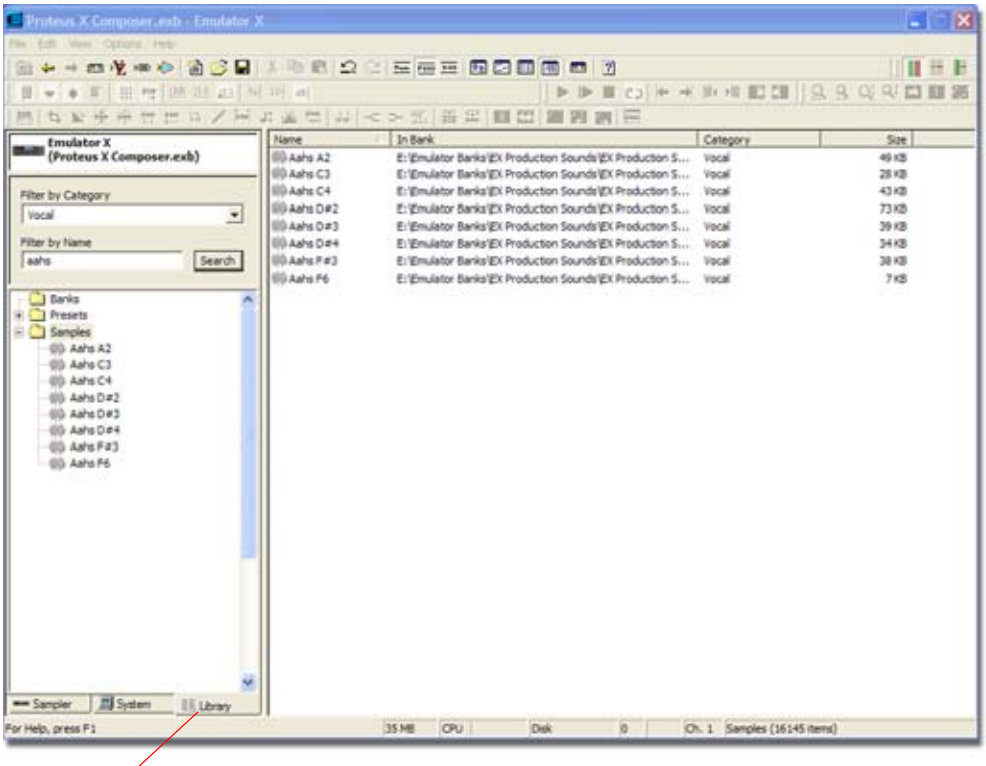
- How to locate samples from your library and load them into the bank
- How to place samples on the keyboard
- How to stretch samples across the keyboard
- How to apply various types of processing to the samples

▶ *Locate Samples and Load them into the Bank*

1. Make sure you have either the Proteus Composer or Proteus X Composer bank on your hard disk.
2. Let's start with a clean slate. Select **New** from the **File** menu.
3. The easiest way to find samples is using the Library feature. Click the **Library** Tab at the bottom of the Tree.

- **Important:** If the Librarian doesn't find the samples, select **Update Library** from the **File** menu. *(You need to have Proteus X Composer in your System.)*

4. Select **Vocal** as the Category, then type "**aah"** in the 'Filter by Name' box. Click **Search**. (Note spelling of aah!)



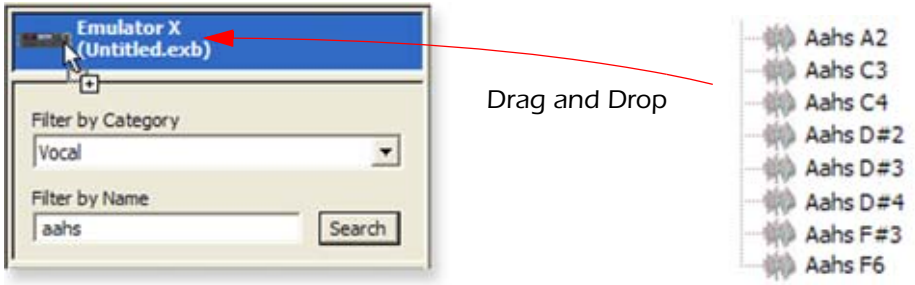
Library

5. Clicking on the **Samples Folder** in the Tree displays the expanded list in the main window.

6. The window should look something like the one shown above, although you may have more samples shown, depending on the size of your sample library.
7. Locate the following samples: Aahs A2, Aahs C3, Aahs C4, Aahs D#2, Aahs D#3, Aahs D#4, Aahs F#3, Aahs F6. **Can't Find?** Check the spelling: "Aahs"

- **Tip:** Select multiple continuous samples by pressing on the **Shift** key while selecting items. Select multiple non-continuous samples by pressing the **Ctrl+W key** while selecting items.

8. Select the samples listed above and while holding the mouse button, drag and drop them on top of the Emulator X/Proteus X icon above the Tree.



9. Click the **Sampler** Tab at the bottom of the Tree, then double-click the **Samples Folder** to open it. You'll notice that the samples have now been added to the Bank.
10. Click on one of the **Sample** icons in the Tree. The Sample Editor appears with one of your Aahs waves displayed.

11. The sample is of a fixed length. So that the sample will play for as long as you hold a keyboard key, the sample is looped. Notice (but don't change) the Start and End Loop Markers.
12. Looping is a subject for another tutorial. At this point, let's move on to the next step in building a Preset, and place the samples on the keyboard.

Time to Save?

13. It's time to save whenever you have done enough work that you'd HATE to lose it. Now would probably be a good time.
14. Select **Save As...** from the **File** menu, choose a location where you can find it again (the desktop?), and press **Save**. Don't you feel better?

▶ *Placing the Samples on the Keyboard*

1. Click on the **Presets Folder** in the Tree, then select **New Preset** (Ctrl+W) from the Presets menu. A new preset appears in the Tree.
2. Select **Voices and Zones** in the new preset. The Voices and Zones page appears.
3. Select **Aahs A2** from the list in the Tree, then **drag and drop it** anywhere in the Key Win area as shown below.

4. A new voice named **Aahs A2** appears in the window. A green bar appears across the entire keyboard range indicating that the sample is transposed across the entire keyboard. The red bar shows the original key. Because the original pitch of the sample (A2) is included in the name, Emulator X/ Proteus X is smart enough to place the original pitch on the proper key.

- **Important:** If the original key of a sample is on the wrong key, the sample will be out of tune. The original key selection field is always visible regardless of which tab is selected.

Original Key Selection

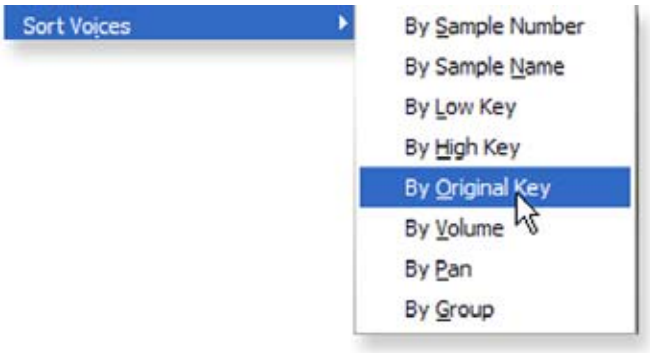
5. Play the keyboard. Since the sample is transposed over the entire keyboard range you can play it polyphonically at any pitch. But as you play in the upper part of the keyboard, notice that the sound doesn't sound so natural anymore. This is a result of the sample transposition. To overcome this problem we add more samples.

- **Tip:** Choose Ultra-High Precision Interpolation in the **Audio Preferences** for the best sample transposition at the expense of reduced polyphony.

6. This time, let's use a different method of assigning samples. This method is useful if the original pitch is NOT included in the sample name. Select **Aahs D#2** from the list in the Tree, then **drag and drop it** over the **D#2 key** on the keyboard at the bottom of the window.

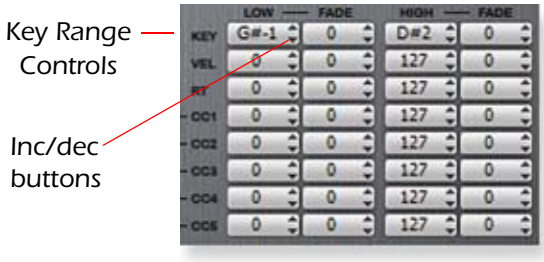
7. A new voice named **Aahs D#2** appears in the window on note D#2.
8. Continue placing the rest of the samples. Practice using both methods.
9. Select the **Key Win** tab. This window graphically displays the current sample to keyboard mapping. Depending on the way you placed your samples, the display might look something like this. The red bars show the original keys.

10. Notice that the top voice has no sample. This empty voice was created when you created the Preset. We won't need this voice and can get rid of it. Select the empty voice by clicking on it. It becomes highlighted in red. Press the **Delete** key on your keyboard to delete it.
11. Also notice that the original keys of our voices are all over the place. Let's rearrange the voices by the position of the original keys. From the Preset menu, select **Sort Voices**, **By Original Key**.



12. Now the voices should be arranged like the screen below.

13. Next, we need to give each sample its own keyboard range. Click on the original key of **Aahs D#2** and drag it all the way to the left.



14. You can also adjust the key range using the key range controls in the lower right corner of the window. Click the **inc/dec** buttons and note that the graphic display follows. The Key Range display shows the currently selected voice. The Key Range Controls allow you to select multiple voices and change them all to a single value if so desired.
15. Adjust the range of all your voices until the display looks like the one below. Make sure that none of the voices overlap each other and that all the keys are covered.

16. Play the keyboard. The choir sounds much more realistic, especially in the middle range.

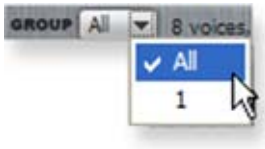
Time to Save?

17. It's time to save again. This time just select **Save** (Ctrl+S) from the file menu.

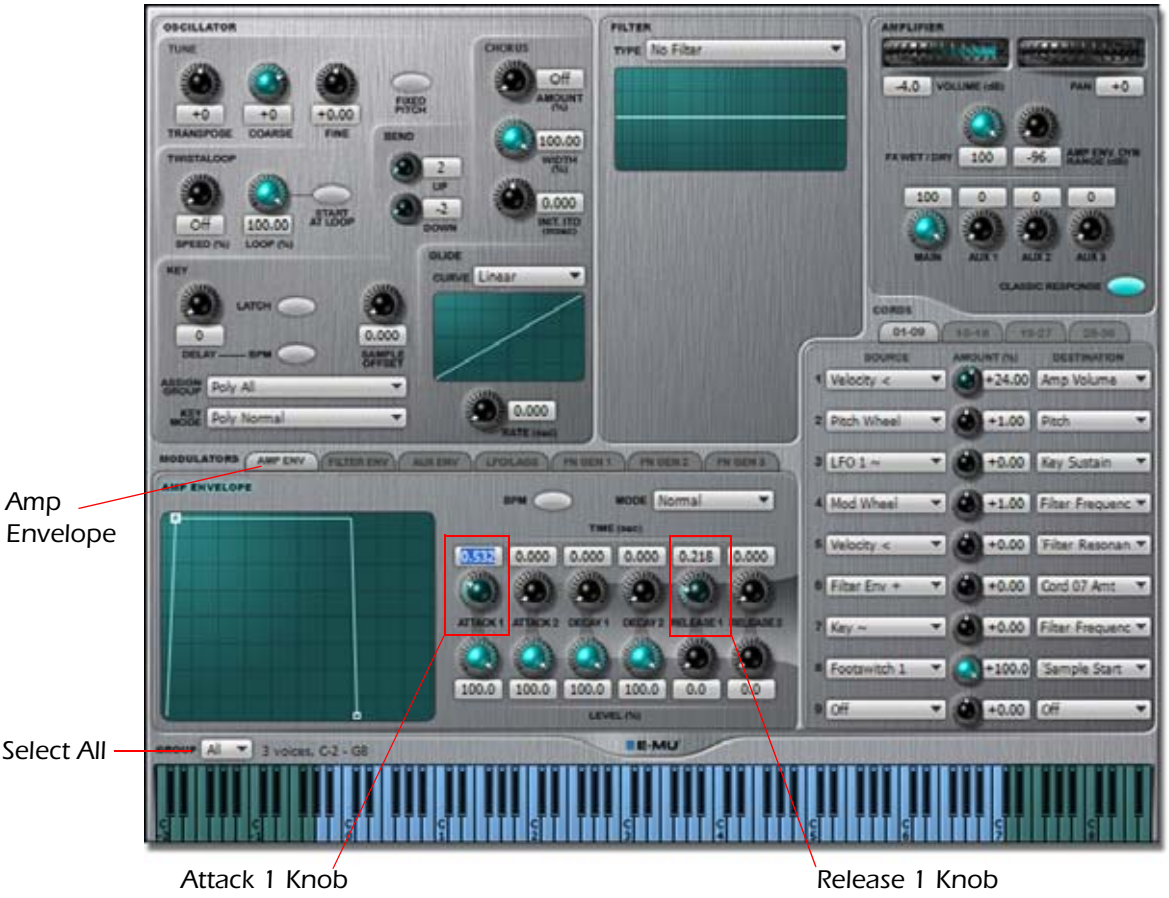
▶ Apply Voice Processing

Now that we have our samples arranged, we can continue to refine our preset using the filters and amplifier.

1. Select the Voice Processing page by clicking the Voice Processing icon in the Tree. Voice Processing The Voice Processing page appears. See the screen below.
2. In the Emulator X/Proteus X, each voice is a complete synthesizer with its own set of parameters. In most cases, you'll want to treat the voices as a single synthesizer. Select **All** voices from the **Group** box above the keyboard in lower part of the window.



- **Important!** Selecting the proper voices to modify is a **KEY** operation and it's easy to get confused. If the synthesizer controls don't seem to be working correctly, check to make sure you have the correct voices selected. The **Back Arrow** allows you sequentially undo the last operations.



Amplifier Envelope

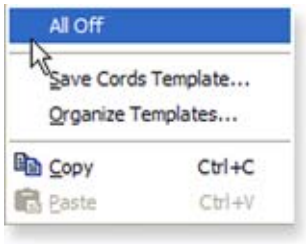
3. Our choir sounds pretty good, but the sound turns on abruptly like an organ. Let's increase the Attack Time a little so that the voices swell up when

we press the keys. The Amplifier has its own dedicated Envelope Generator and it's already selected. **Set the Attack 1 knob to about .5 seconds.**

4. Much better! Let's increase the Release Time so that the sound dies away slowly when the keys are released. **Set the Release 1 Time to about 1 second**. Heavenly!

Clear the Cords

5. Before we begin, take a look at the Cords section for a second. Cords are the virtual wires that connect everything together in the Emulator X/ Proteus X. A bunch of Cords are already connected to their default connections. We don't want or need these Cords, so let's get rid of them.



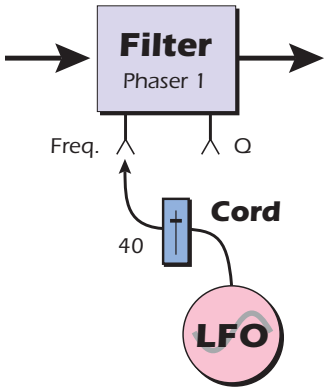
6. Right-click anywhere inside the Cords section. A pop-up selection box appears. Select **All Off** to clear all the Cords. Poof!

- **Note:** Unused Patchcords use CPU cycles. If you're not using a cord, it might be a good idea to disconnect it (both source and destination).

Phaser Phun

7. Now let's add a filter effect. Select **Phaser 1** from the Filter Type menu. This filter simulates a traditional phase shifter by creating two deep notches in the frequency spectrum. Leave the Frequency and Resonance settings at 0.0 for now.
8. Let's add a bit of movement to the filter by connecting an LFO to the Filter Frequency. An LFO or **Low Frequency Oscillator** is simply an wave that repeats slowly. The LFOs have a range of .08 Hz (12.5 seconds per cycle) to 18 cycles per second.
9. Click on the fields to select source and destination for the cord. Set-up Cord 1 as shown at right with **LFO 1+** as the source, **Filter Frequency** as the destination, and an amount of around **+40.00**.

10. A block diagram of the connection you just made is shown below.



11. Play the keyboard and you'll hear the phaser filter sweeping the two notches across the frequency spectrum.
12. Let's tweak the LFO a bit. Select the **LFO/LAGS** page by clicking on the LFO/Lags tab. Set the Frequency to about **0.9 Hz** and change the Shape to **Sine**.

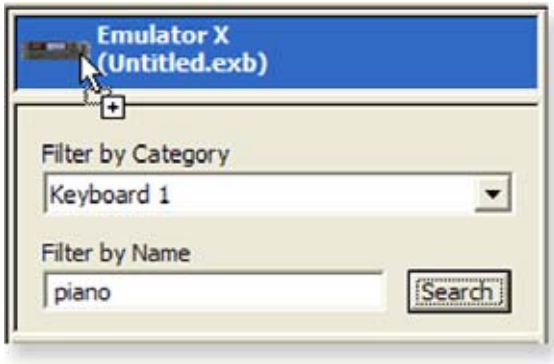
13. If you have trouble adjusting with the knob, try typing the value into the numeric field. Once the numeric field "has the focus" you can use the up/down keys on your computer keyboard to increment or decrement values.
14. Now the effect is a lot more subtle. Increase the **Filter Frequency** to about **25** to "zero-in" on the main group of frequency components. Feel free to tune the filter to your own taste. You can also adjust the **Cord Amount** along with the Filter Frequency to get the effect you want.
15. The **Resonance** control (Res) adds resonant peaks and deepens the notches in the filter. Try it out.
16. Explore a little on your own. Go ahead and try out different LFO wave shapes, or different filter types. *(Be careful. Some of the filters have extremely high gain at certain frequencies and they may distort with the harmonically-dense voice samples.)*

▶ Load an Entire Preset

Now we're going right back to where we started, but instead of loading individual samples, let's load a complete Preset.

1. Select the **Library** Tab in the Tree.
2. Select **Keyboard 1** as the "Filter Category" and type in piano in the "Filter by Name" box. Click the **Search** button.

3. Double-click on the **Presets** folder in the Tree to open it. You should see several piano presets there.
4. Select one of the piano presets then **drag and drop it** over the Emulator X or Proteus X icon above the filter selections.



5. Switch back to the **Sampler Tab** beneath the Tree and see your piano preset in the bank.
6. Select the piano preset and play the keyboard. That was easy!
7. Save the bank.

Signing Off

We've covered a lot in this lesson. Now you know how to create a preset from samples and how to create a custom bank from the presets in the library. This is a very 'deep' instrument, so don't expect to learn it all in one day. Explore a little at a time and most of all don't forget the music, because that's what it's all about. Have fun!

4 *Easy Sound Creation using Links*

Preset Links allow you to easily combine multiple presets into layers or keyboard splits. You can switch or crossfade sounds based on either key position or key velocity.

▶ Create a Stacked Preset:

1. Load any bank of presets.
2. From the **Sampler Tab** of the Tree, click on the **Presets** folder.
3. Select **Preset -> New Preset** to create a new blank preset. "Blank Preset" will appear in the Tree. (Hint: Look at the bottom of the list.)
4. **Rename** your new preset
5. **Double-click on the plus sign** of your new preset to open it. The Voices & Zones, Links and Voice Processing branches appear.
6. Click on the **Links** icon. The Link window appears.
7. Select **Links -> New Link** to create a new blank link.
8. Click on the **Preset button** to the right of the preset field.
9. Select a preset.
10. Repeat steps 6 through 9 to add another preset.

Since the keyboard ranges of the two presets cover the entire keyboard, both sounds play whenever you press a key. This is called a “stacked” preset. If you wanted to create a keyboard “split” with one sound on the lower half of the keyboard and another on the top half, simply adjust the keyboard ranges of the two preset so they don’t overlap. It should look something like this:

Split Keyboard

- **Tip:** To crossfade the key ranges, hold the **Crtl** key on the computer keyboard and drag one end of the bar (or type in a fade amount).

- **Note:** When linking presets, the Initial Controller settings of the first preset are imposed on the linked preset. This may change the sound of the linked preset. Sometimes switching which preset is the Link will correct the problem. If this doesn’t work you will have to edit the Initial Controller settings until both presets sound the way you want.

▶ To Crossfade between two Presets based on Key Velocity:

1. Set the key range of both presets to cover the entire keyboard.
2. Press the Vel Win (velocity window) button.
3. Adjust the Velocity Range for each preset while playing the keyboard so that a smooth transition is heard between soft and hard key velocities. See the example below. You may have to adjust the volume of one or both presets (Mix/Tune) to achieve a smooth transition.

Velocity Crossfade

Subsume!

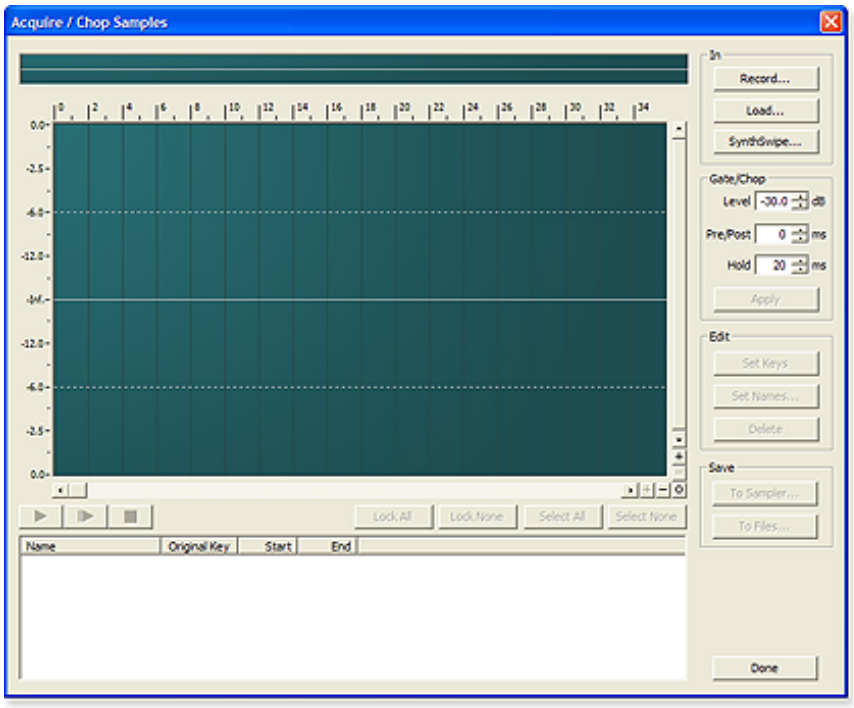
If you like the way you new linked preset sounds and want to make it permanent, you can use the **Subsume Links** command (found in the Links menu). This handy feature copies the voices from the linked preset into the current preset and then removes the links.

5 Sampling and Chopping Samples

This tutorial walks you through the process of sampling, sample chopping and then placing the multiple samples on multiple keys. A good way to practice is by sampling your voice speaking a phrase, since the chopper is designed to separate individual samples from a continuous recording.

▶ Import or Acquire your Samples

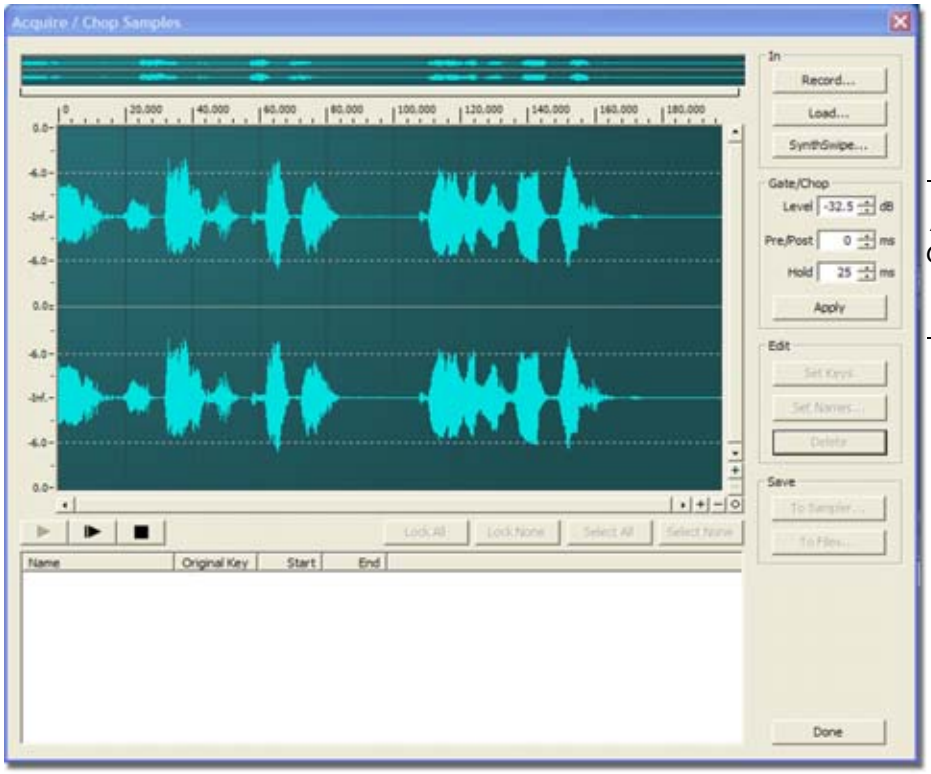
1. Select **New** (Ctrl+N) from the **File menu** to create a new empty bank.
2. Select **Acquire Samples...** (Ctrl+Q) from the File menu. The Acquire/Chop Samples window appears.



3. If you want to record a new sample, press the **Record...** button. If you want to load an existing .wav or .aiff file, press the **Load...** button. Load brings up a standard Windows browser where you select the sound you want load. No problem right? In the next few steps we'll walk you through the process of sampling a new sound.
4. After pressing **Record...**, the Record Audio window appears.

Get Ready to Sample

5. Select the input you wish to use and verify that the meters show signal. Press the **Monitor** button to hear the input signal while recording.
6. Press the red **Record** button to begin recording. Press the **Stop** button or the **Spacebar** to stop recording.
7. If you are happy with your sample press **Done**. The Record Audio window disappears and the sample appears in the Acquire/Chop Samples screen.
8. The display should look something like the one shown below where we have sampled a spoken phrase.



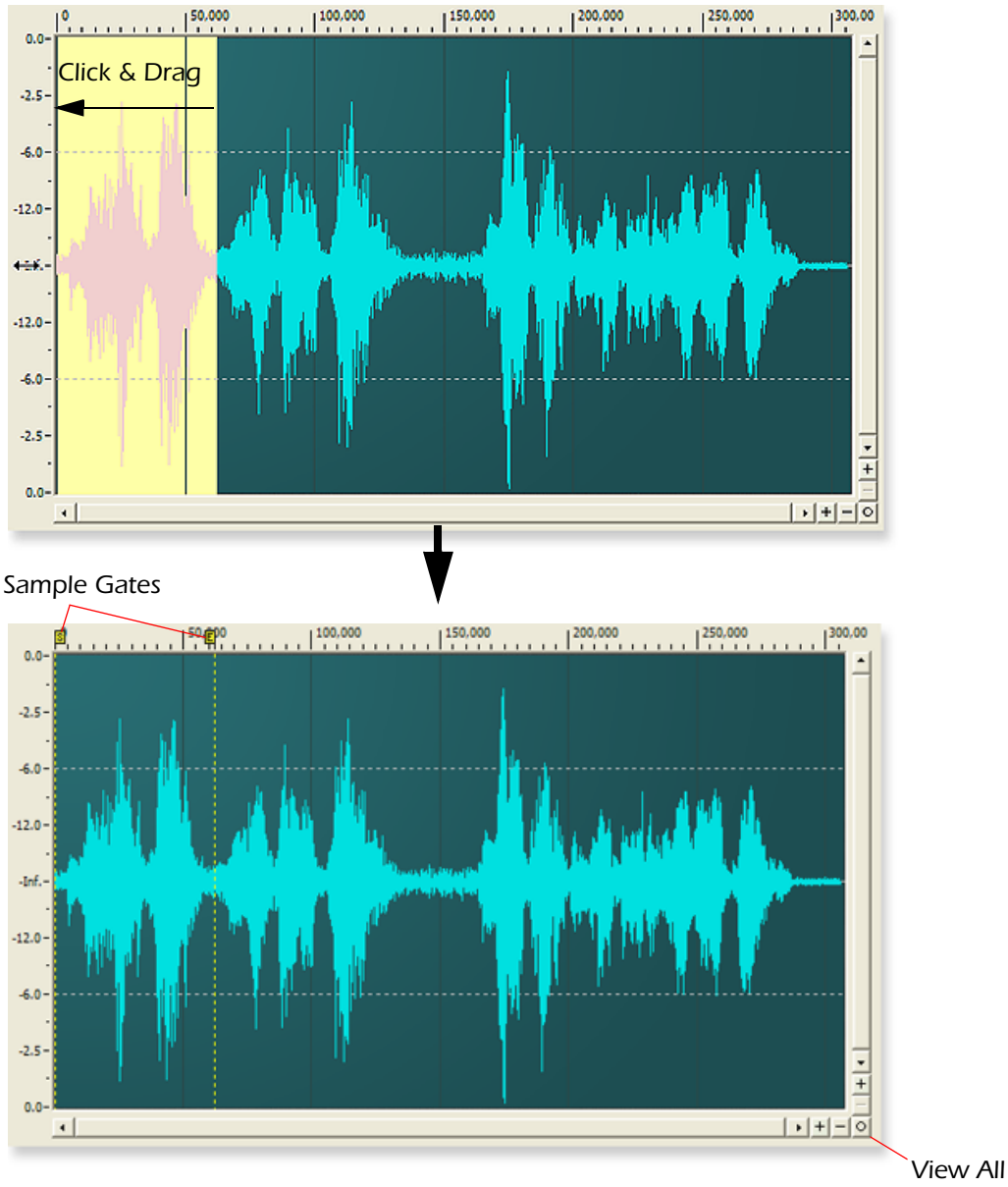
Automatic Gate/Chop Controls

9. The Gate/Chop controls are designed to automatically separate the samples and this feature works well if the individual samples are separated by silence. In the case of speech, it doesn't work so well because of the complexity of the waveform. Too many gates are chose.
10. You can go ahead and try the auto Gate/Chop with your sample by pressing the **Apply** button. Press **Delete** to clear the gates. Adjust the **Level** setting and press **Apply** to try again.

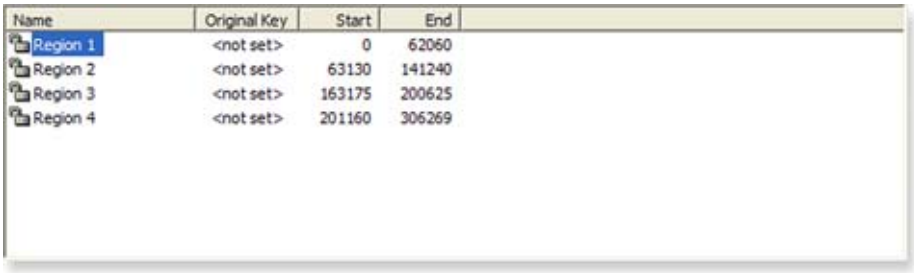
Setting the Gates Manually

11. Press **Delete** to clear any gates you may have created with the previous step.
12. Press the **Play from Start** button to listen to your sample again. Note the approximate location of each word in your spoken phrase (sample).

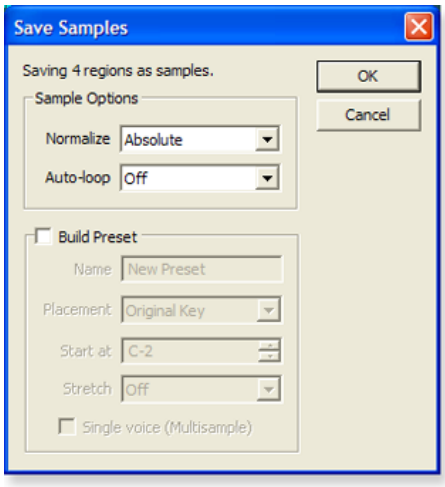
13. **Click and drag** across the first word in your phrase. Sample Gates appear at the sample boundaries when you release the mouse button.



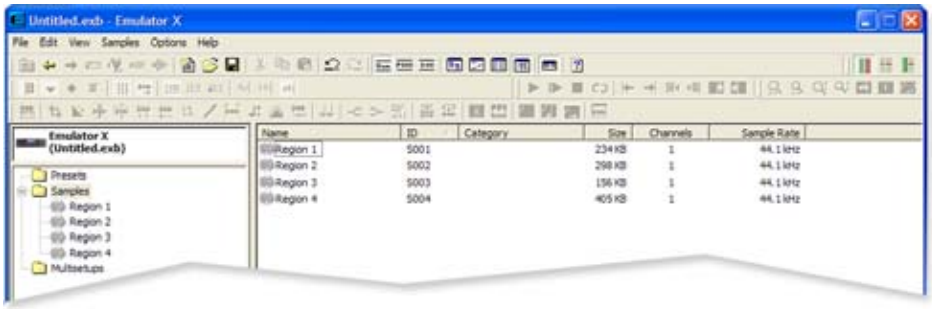
14. Press the **Play** button to hear just the Gated area of the sample.
15. Adjust the Start and End Gates as necessary to zero in on the section you want.
16. Repeat steps 13-15 until you have all the individual words (if you sampled speech) isolated.
17. As you've been selecting the Gates, you've probably noticed that new Regions have been added to the list below the waveform display. Click on the **Region Name** to select it in the waveform display. Click the **Play** button to hear the selected Region.



18. **To delete a Region**, select it and press the **Delete** button on your computer keyboard.
19. If you wish, you can name the Regions now. Click on the region name and type.
20. When you have all the Gates set the way you want them, click the **Select All** button.
21. Press the Save **To Sampler** button. The pop-up dialog box shown below appears.



22. Set-up the options as shown above, then click **OK**. The selected Regions are exported into the Emulator/Proteus X.
23. Click **Done** to close the Acquire/Chop Samples window. The Samples appear in the samples folder.

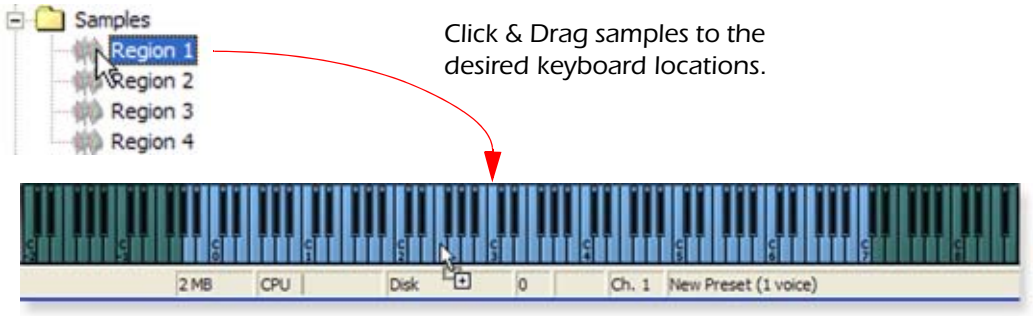


Make a Preset

24. Select the **Presets folder** in the Tree. Presets
25. Select **New Preset** from the Presets menu (Ctrl+W), or by **Right-clicking** on the Presets folder. A new empty preset appears in the Tree.

Place the Samples on the Keyboard

26. Select **Voices and Zones** in the new preset. The Voices and Zones page opens.
27. **Click and drag the samples** from the Sample folder in the Tree down to the keyboard at the bottom of the Voices and Zones page. See the diagram below.



28. Congratulations! You've just created a preset from scratch. A new voice is created for each sample you placed.
29. Play your MIDI keyboard to verify that the samples play.
30. If you want to change the location of the samples, click the **Key Win** tab. You can select the key range of each voice by typing in the selection area in the lower right section of the page, or by dragging the bar in the graphic display.
31. Be sure to **Save the Bank** if you want to keep your work.

Further Explorations

Each of the voices you just created has its own set of synthesizer parameters.

To modify the voices

32. First select the Voice Processing page. To modify all the voices select **All** as the group. GROUP All 4 voices, C2 - F2 You're in! Start tweakin'.
33. To modify each voice separately, first assign each voice to a different group in the Voices and Zones page, then select the individual voice you want in the Voice Processing page.

6 *Importing from an Audio Sound Library*

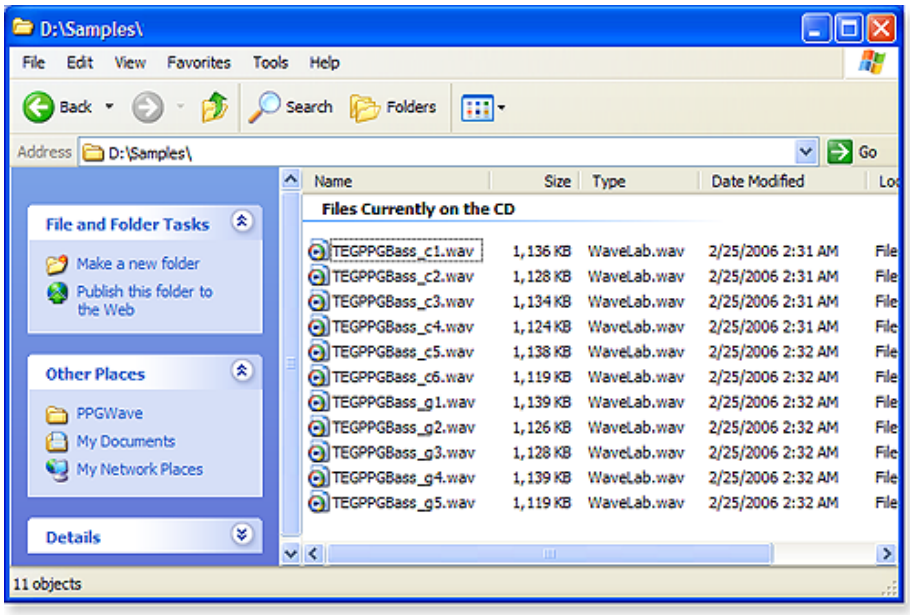
Aside from commercial sound libraries, there are literally thousands of samples available free or at a nominal cost on the internet. In addition, electronic music magazines such as Computer Music and Sound-On-Sound occasionally give away CDs or DVDs containing quality audio samples.

Using the Auto-sampling (ASAP) and Acquire features of the Emulator X you can slurp up these free samples and automatically create great custom presets.

- Before you begin, locate a source of .wav samples. We're using a DVD sample collection included in a recent issue of Computer Music magazine.

▶ To Import a Batch of .wav Samples:

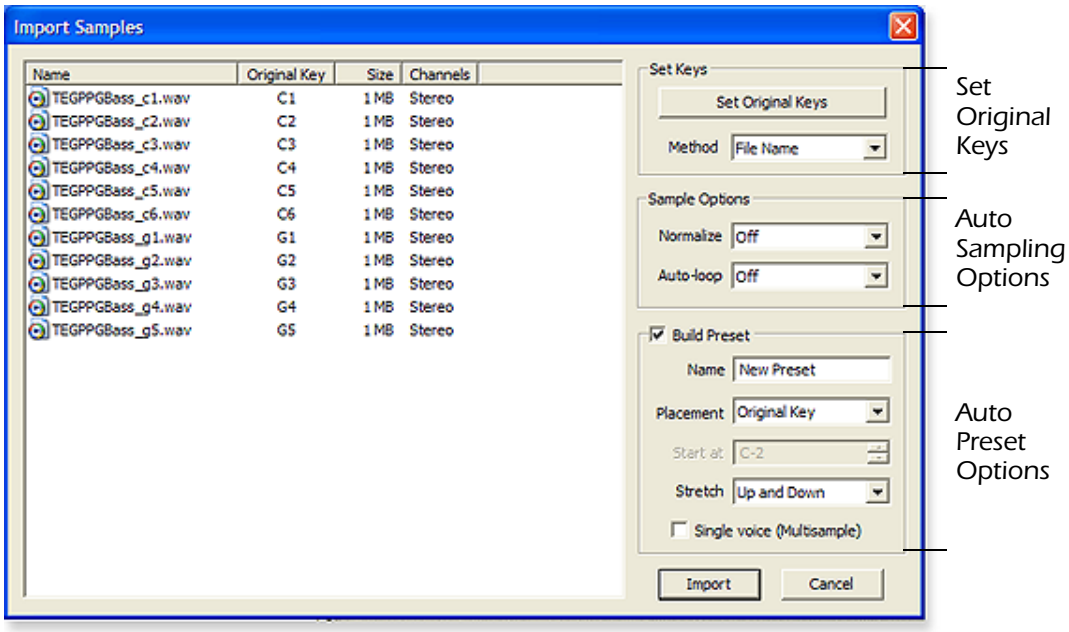
1. Let's start with a clean slate, so run the Emulator X (standalone) and select **New** (Ctrl+N) from the **File** menu.
2. So you've located a folder of .wav or .aiff samples you want to import from a sample CD. We've selected a group of **PPG Bass** samples from the DVD.


D:\Samples\
File Edit View Favorites Tools Help
Back Search Folders
Address D:\Samples\
Go
File and Folder Tasks
Make a new folder
Publish this folder to the Web
Other Places
PPGWave
My Documents
My Network Places
Details
Name Size Type Date Modified
Files Currently on the CD
TEGPPGBass_c1.wav 1,136 KB WaveLab.wav 2/25/2006 2:31 AM
TEGPPGBass_c2.wav 1,128 KB WaveLab.wav 2/25/2006 2:31 AM
TEGPPGBass_c3.wav 1,134 KB WaveLab.wav 2/25/2006 2:31 AM
TEGPPGBass_c4.wav 1,124 KB WaveLab.wav 2/25/2006 2:31 AM
TEGPPGBass_c5.wav 1,138 KB WaveLab.wav 2/25/2006 2:32 AM
TEGPPGBass_c6.wav 1,119 KB WaveLab.wav 2/25/2006 2:32 AM
TEGPPGBass_g1.wav 1,139 KB WaveLab.wav 2/25/2006 2:32 AM
TEGPPGBass_g2.wav 1,126 KB WaveLab.wav 2/25/2006 2:32 AM
TEGPPGBass_g3.wav 1,128 KB WaveLab.wav 2/25/2006 2:32 AM
TEGPPGBass_g4.wav 1,139 KB WaveLab.wav 2/25/2006 2:32 AM
TEGPPGBass_g5.wav 1,119 KB WaveLab.wav 2/25/2006 2:32 AM
11 objects

3. You could audition these .wav files first using WaveLab or Windows Media-Player, but it's so easy to import them into the Emulator X, why bother?

Import

4. To import the samples, simply **select the whole batch and drop them on top of the Emulator X icon** above the Tree. A little ⊞ appears below the cursor indicating that the samples are being added to the bank.
5. The **Import Samples** window appears with the new samples listed.



Set Keys

6. If the pitch information is embedded in the .wav file or if the original key is contained in the sample name (as they are in our samples), the Emulator X automatically fills in the Original Key field.

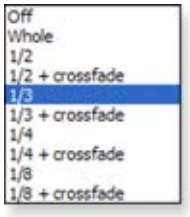
- **Setting the proper Original Key is important** because this determines the tuning of the samples when they're assigned to the keyboard.

7. If the original key is not automatically filled in, you can choose another method for selecting original keys in the Set Keys box. Use **Pitch Detect** for pitched sounds. Use **White Keys** or **Chromatic** for percussion or sound effects when you want a different sample on every key.

Automatic Sampler Options

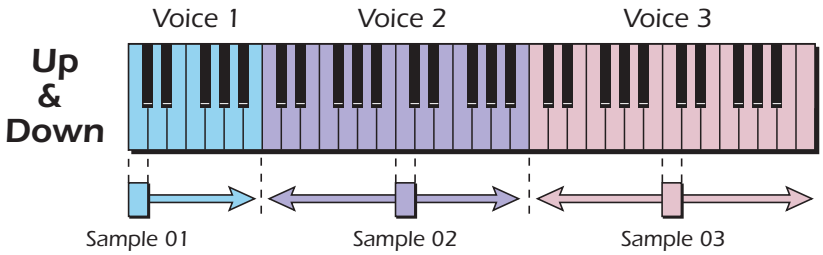
8. These samples have probably already been normalized, so we'll leave this feature turned Off.

9. Since these are synthesizer samples, they'll probably be pretty easy to Auto-loop. We've guessed **1/3 with no Crossfade** looping for these sounds. Some sounds, such as strings, are more difficult to loop without getting ticks. Crossfade looping smooths out the differences at the loop points, but modifies (smears) the original wave when doing so. Crossfade Loops should be used as a last resort.

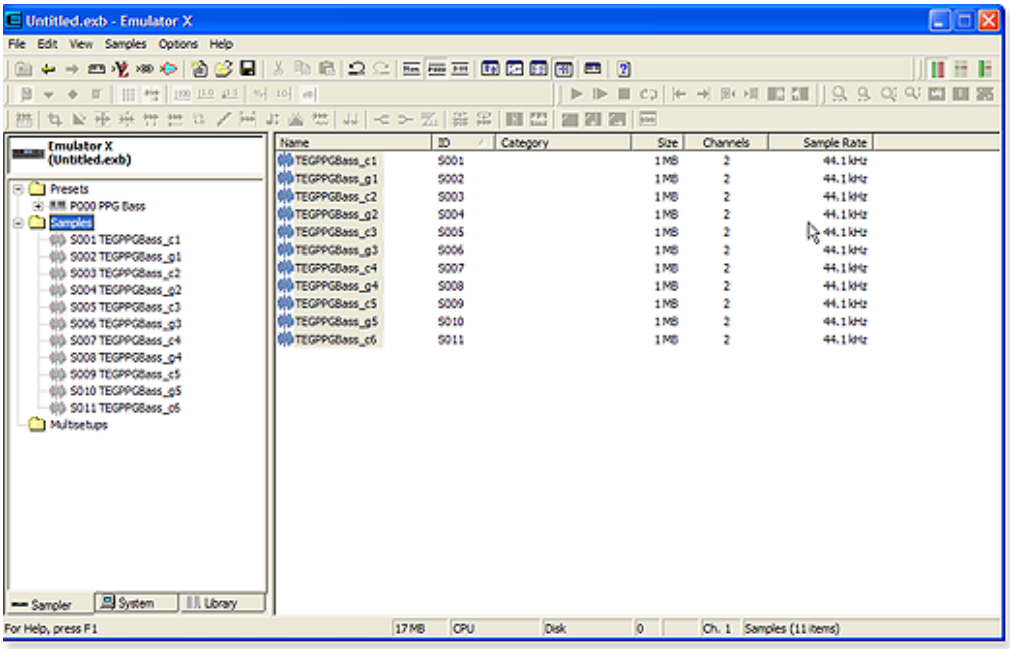


Build a Preset

10. Turn **Build Preset** On and set **Stretch** to **Up and Down**. This option fills in the keyboard above and below the original key.

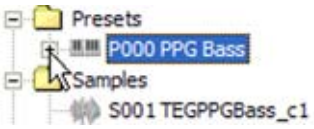


11. **Placement** should be set to **Original Key**. You could also **Name** your new preset now if you so desire. Single Voice (Multisample) should be unchecked (Off).
12. Press the **Import** button to complete the process. A progress bar appears as the samples are imported.
13. Voila! A new preset has been created. Play the keyboard.



Sound Sculpting

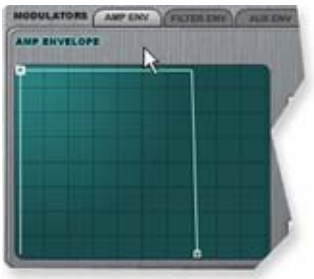
14. Now let's do a few quick modifications to the sound in the Voice Processing page. Click on the plus symbol ⊞ next to your preset in the Tree to open the preset.



15. Next, select the Voice Processing page by clicking the icon. The Voice Processing page contains the synthesizer controls.

Using Templates

The easiest way to change the synthesizer settings is by using the **Templates**. Templates let you save useful settings for each synth module. The Emulator X comes pre-loaded with templates you can use.



16. **Right-click** anywhere in **the Amp Envelope** section. A pop-up list of Templates appears.
17. Try out **String Pizz - Amp**, which gives you a percussive envelope. Find one you like.

The Filter

18. Select **4 Pole Lowpass** as the filter type and set the filter frequency to about **500 Hz**.
19. Turn up the amount of Patchcord 6 to about +60.

20. Click the **Filter Env** tab, FILTER ENV then Right-click over the envelope section to bring up the list of Templates.
21. Select **Falling Sweep** from the template list and listen to the sound.
22. Now adjust the **Filter Frequency**, **Filter Q** and **Filter Env** Cord Amount to your own taste. These are the "big three" synth controls. Master these and you can rule the world!
23. We're going to leave you to your own devices *(no pun intended)* at this point. Remember to **Save the Bank** or all your work will be lost.
24. Feel free to try out the Templates for the other synthesizer modules and don't forget the Effects. Making presets is easy when you know the tricks.

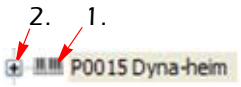
7 Patchcord Programming - Vibrato & Tremolo

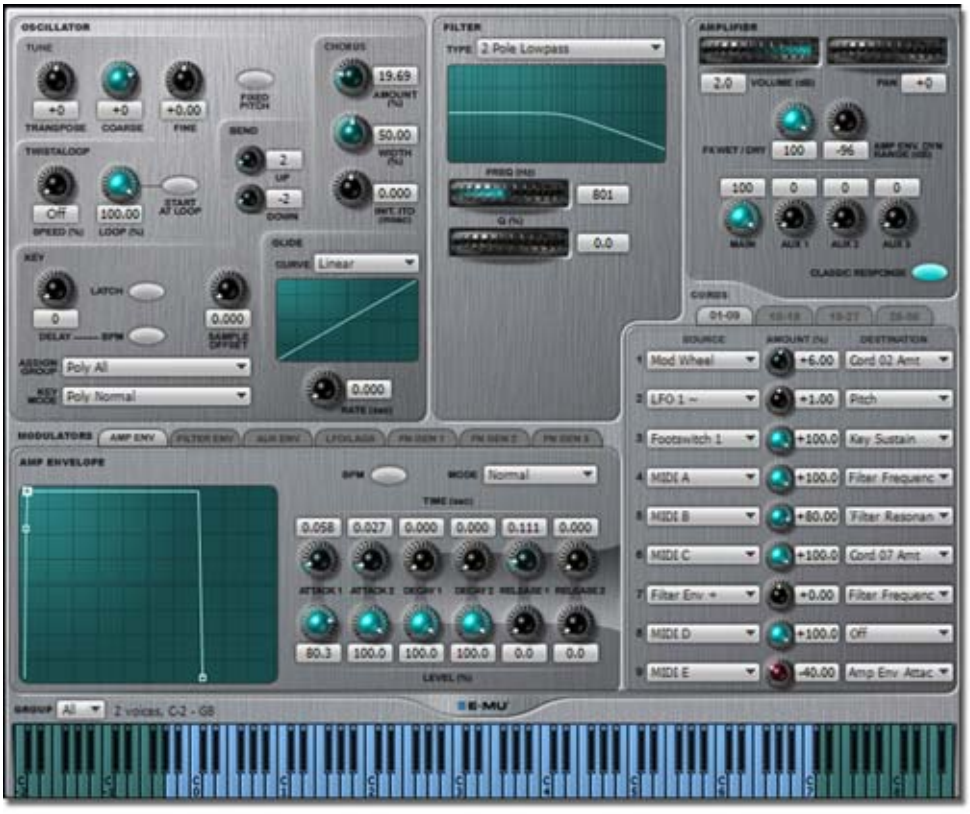
Patchcords are a common source of confusion, but they really shouldn't be, because they are very easy to understand and use. Patchcords are used to connect modulation sources, (such as an LFO, MIDI controller knob or an envelope generator) to the thing you want to change (such as pitch, volume, filter frequency, or even another patchcord).

The easiest way to understand how the patchcords work is to examine one of the factory presets. In preparation for this tutorial, load up the Proteus Composer bank.

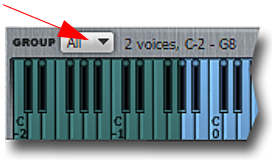
Examine a Factory Preset

1. Select **P0015 Dyna-heim** from the Tree by clicking on the little keyboard.
2. Next click on the **(+)** symbol to open the preset modules.
3. Click on the **Voice Processing icon** . The Voice Processing (synthesizer controls) module appears.





4. Check to make sure the Voice Selector reads **"All"**. This is to make sure that the changes you make will affect all voices in the preset. All the settings on this page can be different for each voice in the preset. With the selector set to "All" you will be modifying all voices.



5. Patchcord number 2 has **LFO 1** connected to **Pitch** with an amount of +1. This creates a very slight vibrato.
6. Turn up the **Patchcord Amount** and note the effect when you play a key. Afterwards, set the amount to **zero (0)**.
7. Note that Patchcord #1 has the **Mod Wheel** connected to **Cord 2 Amount**. This cord allows the modulation wheel on your controller to turn up the LFO amount being sent to Pitch, just as you did manually in step 6.

- Note that the **Amount** setting of **Cord 1** determines the MAXIMUM amount of modulation that can be applied using the Mod Wheel.

✸ Controlling the amount of a Patchcord with another modulation source is a fundamental concept in Emulator X and Proteus X.

Modify the Patch

8. Select **LFO 2+** instead of the **Mod Wheel** for Patchcord Source 1. (You might want to decrease the frequency of LFO 2 to hear the effect better.)
9. Try patching different modulation sources to control the amount, such as the Aux. Env., Velocity, Pink Noise, Key Random.

Tremolo

Tremolo is **Volume Modulation** (instead of pitch modulation as in vibrato) and is usually implemented using an LFO to cyclically change the volume.

10. Simply change the destination of **Patchcord 2 to Amp Volume** (turn up the Cord Amount) to hear this effect. The Mod Wheel is commonly used to control this effect as well.

Auto-Pan

Auto-Panning is simply **Pan Modulation** and creating this effect is a simple matter of changing the Patchcord.

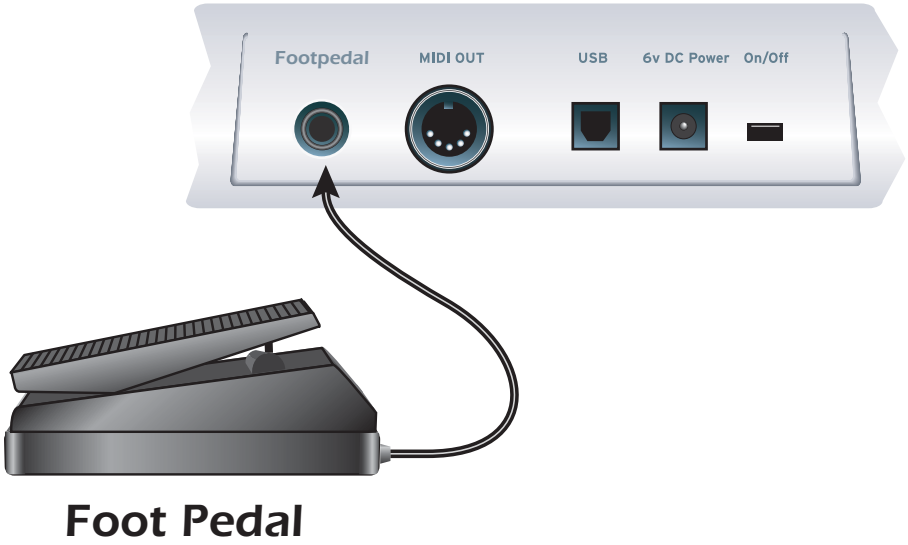
11. Simply change the destination of **Patchcord 2 to Amp Pan** to hear this effect. You can use the Mod Wheel is commonly used to control this effect if you wish.

8 Connecting a Volume Pedal

Connecting a continuously variable controller pedal to your MIDI keyboard allows you to control any parameter without taking your hands off the keyboard. In this example we'll get the pedal connected properly and set it up as a volume pedal.

▶ To Connect the Pedal and Set the MIDI Controller Number:

1. Connect a continuously variable control pedal to your MIDI keyboard controller.



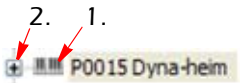
Foot Pedal

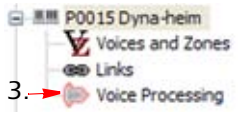
- **Important**: You must use a pedal that is compatible with your keyboard. Control pedals can be wired in several different ways. An incompatible pedal probably won't cause any damage, it just won't work.

2. Set up your MIDI controller to transmit the Pedal input as MIDI continuous controller **Number 4.** (This is the default setting in the Emulator X/Proteus X.) The important point here is that the pedal CC number sent by your keyboard MUST match the number programmed in the Preferences, Controllers menu in Emulator X/Proteus X.

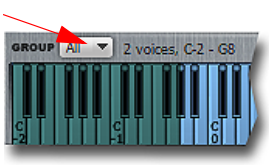
▶ To Program the Pedal to Control Volume:

1. Select **Any Preset** from the Tree by clicking on the little keyboard.
2. Next click on the **(+)** symbol to open the preset modules.
3. Click on the **Voice Processing icon** . The Voice Processing (synthesizer controls) module appears.





4. Check to make sure the Voice Selector reads **"All"**. This is to make sure that the changes you make will affect all voices in the preset. All the settings on this page can be different for each voice in the preset. With the selector set to "All" you will be modifying all voices.



5. There are four pages with nine Patchcords each. Browse through the pages using the Page Selector buttons until you find an unused Patchcord (one that is turned Off).

6. Program the unused Patchcord so that **Pedal** is being sent to **Amp Volume**. Set the Amount to 100%. Like this:

7. The last step is to turn down the initial Amp Volume. This silences the output unless the Pedal is depressed, turning the volume up.

8. That's it! Try out your new volume pedal.

Not Working? Check the following:

- Make sure your controller is sending on the **proper MIDI Channel** and the **CC number** for the Pedal is **CC#4.**
- Is **Pedal** set to **004 (Pedal)** in the Emulator X/Proteus X **Preferences**?
- Try changing the Cord destination from **Amp Volume** to **Pitch**. Do you hear the pitch change when you move the pedal?
- Make sure you have **ALL** voices selected in the Voice Selector.

9 Programming a Filter Pedal

Using a pedal to control the filter gives you a huge amount of expressive control over the sound without ever taking your hands off the keyboard. With the huge variety of filter types available on the Emulator X/Proteus X you can do anything from a simple tone control to complete sound transformation with a flick of the toe.

▶ To Set up a Filter Pedal:

1. Setting up a Filter Pedal is a lot like setting up a Volume Pedal, so first follow the instructions given in the previous example “Volume Pedal” up to **step 5**, then continue.
2. Change the **Pedal Cord Destination** to **Filter Frequency**. Set the Cord amount. The amount determines “how much” the pedal will affect the filter frequency. If you want just a slight amount of control, set the amount to a low value; if you want a lot of control, set it to 100%.
3. **Choose a filter type.** A 2 or 4 pole lowpass filter will give good results, but you can use any filter you like.
4. Lower the **Initial Filter Frequency** as shown in the screen below. (The pedal is going to add to the initial value and if the frequency is set too high you won’t hear anything.)

Lower the initial frequency.

- The ***Initial Frequency*** *determines the tone when the pedal is* ***Up***.
- The ***Cord Amount*** *determines the tone when the pedal is* ***Down***.

5. Work the pedal while you play and you should hear the filter sweeping. If not, try another filter type and re-adjust the initial filter frequency.

- MIDI Controller A in the factory presets also affect the filter frequency and may need to be adjusted.
- An easy way to modify a factory preset for a filter pedal is simply to change the source of the cord **MIDI A** to **Pedal**.
- **To Reverse the Filter Pedal:** Use a negative cord amount, then re-adjust the initial filter frequency.

10 *Exploring the Twista Mania Bank*

▶ Exploring TwistaLoop

The easiest way to check out TwistaLoop is by exploring the Twista Mania bank included with your Emulator X2. This bank contains 37 beats with all 16 controllers assigned in interesting ways. So let's check it out.

1. Start by loading the **Twista Mania bank**. Twista Mania has only one preset with a different groove assigned to each key.

What does TwistaLoop do?

2. First of all, just play up and down the keyboard checking out the beats. Notice how the beats are synchronized when you play two or more keys together. Also notice that if you move the Pitch Wheel, the pitch changes, but the beats don't change tempo.
3. To get a better idea of what TwistaLoop is doing, turn **TwistaLoop Override Off** on the main page. Now the beats play at their natural tempi and playing two or more together sounds like a train wreck!

4. **Set TwistaLoop Override back to "-Not Set-"**. In case you're wondering, TwistaLoop Override simply allows this setting to take precedence over all others. You can turn it On, Off, or -Not Set- (i.e. let the preset or voice setting decide).
5. **Try changing the Master Tempo** using the Emulator X tempo control. Notice that the beats all track the tempo changes over a fairly wide range. (Note: If this control is "greyed-out", turn "External Tempo Source" Off in the Preferences menu - *Options, Preferences, MIDI*.)

Try Out the Controllers

6. The 16 controller knobs are pre-programmed to show off the TwistaLoop features. You can select which loop plays in each groove or selectively mute certain beats. Up to five DSP effects can also be added.

   The easiest way to explore TwistaLoop is to find a groove you like, then mutate it using the knobs on your keyboard.

MIDI CONTROLLERS
CTRL A 100 Filter
CTRL B 0 Filter Q
CTRL C 0 L Select
CTRL D 0 Pitch
CTRL E 0 Attack
CTRL F 0 Decay
CTRL G 127 Sustain
CTRL H 5 Release
CTRL I 0 FG 1
CTRL J 0 FG 2
CTRL K 0 FG 3
CTRL L 4 Aux 1
CTRL M 0 Aux 2
CTRL N 0 Aux 3
CTRL O 0 Flanger
CTRL P 0 Growl

(You have assigned your controller knobs, haven't you? If not, see page 13.)

7. The labels give some clue as to their function, but they really deserve a more complete explanation. Please refer to the chart below.

Controller	What the Control Does
Filter	Changes the Filter Cutoff Frequency
Filter Q	Changes the Filter Q (Resonance)
L Select	Selects which loop plays. Each groove contains from 6-8 different loops.
Pitch	Changes the pitch of the grooves without changing the tempo.
Attack	Changes the Attack time of each key press *(but not each drum attack in the grooves)*.
Decay	Changes the Decay time of each key press.
Sustain	Changes the Sustain Level of each key press.
Release	Changes the Release time of each key release.
FG 1	Mutes every other 16th note.
FG 2	Selectively mutes some 16th notes.
FG 3	Widens the Pan Position every 8th note.
Aux 1	Reverb Amount
Aux 2	Delay (BPM) Amount
Aux 3	Tube Amount
Flanger	Flanger Amount *(Preset Effect. To Edit: Click the Preset icon in the Tree.)*
Growl	Growl Amount *(Preset Effect. To Edit: Click the Preset icon in the Tree.)*

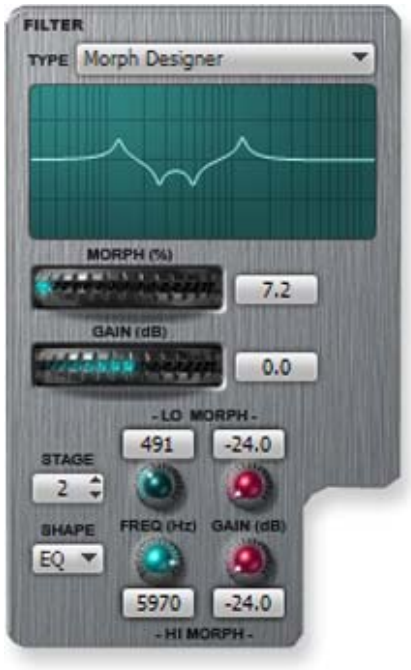
8. **Loop Select** (L Select) shows off one of the ways you can select multiple loops. Because you can selectively loop any section of a recorded drum groove, you can turn a few seconds of drumming into an entire song.
9. To try it out, just play a note and twist a knob. The next loop will start when the currently playing loop finishes.
10. Now try out the Pitch Control. You can actually re-tune the drums in real-time without changing the tempo.
11. Function Generators 1-3 have been programmed to cut out certain notes as the knob is turned up. This is another way you can modify existing drum beats to make them your own. FG 3 dynamically changes the panning.
12. Try adding some effects. There are five effects programmed in this bank.
13. Then there is the **Filter Cutoff** and **Q**, and don't forget that you can select any filter type with the **Filter Override** control.

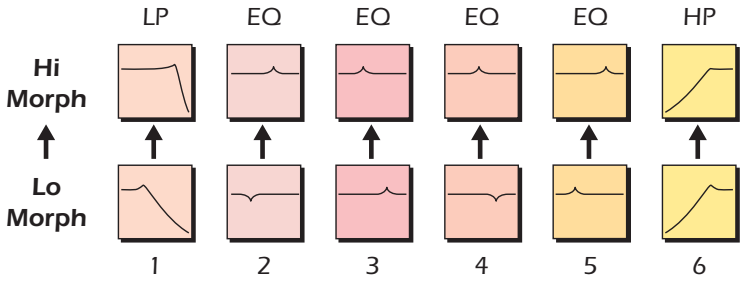
On Your Own

Now you have some idea of what TwistaLoop can do. Check out the next tutorial to learn how to create your own TwistaLoop beats.

11 Building Your Own Filters

The Morph Designer allows you to combine up to six, 2nd-order filter sections (lowpass, highpass or EQ) and then morph between two completely different settings on each of the six sections.





Filter Stages

Any of the six filter sections can be designated as either a lowpass, highpass, or EQ filter. You then set the filter **Frequency** and **Gain/Q** for both the low and high positions of the Morph control. When the Morph control is changed, all the filter controls interpolate between the low and high settings you programmed. This reduces twenty-four knobs to just one extremely powerful control.

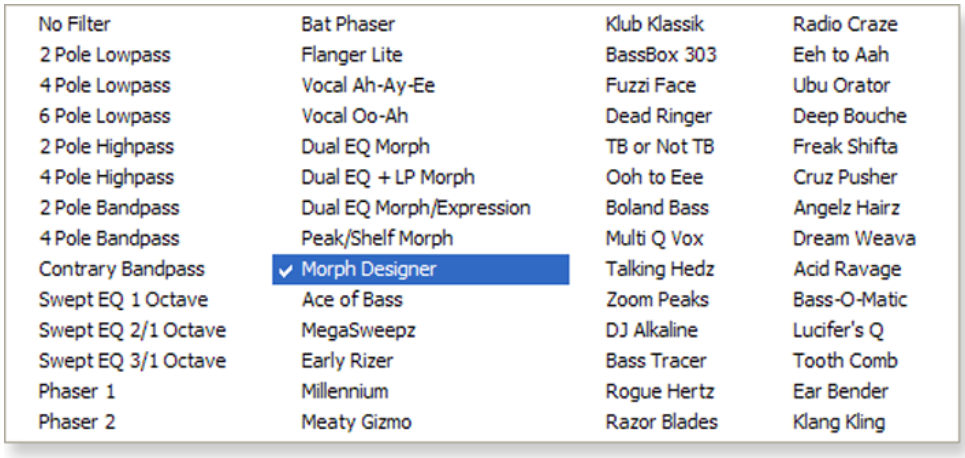
The Gain Controls *(Important! Read this.)*

- The lower Gain wheel affects the gain if the section is an EQ. If the section is a HP or LP filter, the Gain wheel changes the Q.
- The small Gain knobs control the Gain/Q of the selected filter section.
- The Gain wheel adds a Gain or Q Offset to all filter sections. (clipping at 0 or 100%) In other words, it ADDS to the Gain/Q setting programmed in each section.
- **IMPORTANT:** Set the Gain/Q Wheel in the center while programming your Morph Designer filter, and use the Morph control to sweep the filter.

▶ Explore the Morph Designer:

It's easy to create great sounding filters using just 2 or 3 filter sections.

1. Select any preset with lots of harmonic content.
2. Go into the Voice Processing window, select all Groups and select **Morph Designer** as the filter type.



3. Turn **MIDI Controller A** all the way down on your MIDI keyboard.

First Filter Section

4. Select **LP** as the shape for filter Stage 1.
5. Turn the **Morph Wheel** all the way down. *(Select the Wheel, then press Home.)*
6. Set the **Gain Wheel** to its center position. *(Alt+click the mouse on the control.)*
7. Set the **Frequency** and **Gain controls** of the **Lo Morph** all the way down.
8. Turn the **Morph Wheel** all the way up. *(Select the Wheel, then press End.)*
9. Set the **Frequency** and **Gain controls** of the **Hi Morph** to their maximum settings.
10. Now play the keyboard and turn the Morph wheel. You have just created the classic synthesizer lowpass filter response, but in this case the Q turns up automatically when you change the filter frequency. If you turn up the Q Wheel, you get even more Q. *(The Q control adds to the Lo and Hi Q settings.)*

Add Another Section

11. **Select Stage 2** and this time choose **EQ** as the filter type.
12. Turn the **Morph Wheel down** (you can leave the Gain Wheel centered).
13. Set the **Lo Morph Frequency** to the minimum setting.
14. Set the **Low Morph Gain** to zero. *(Alt+click the mouse on the control.)*
15. Turn the **Morph Wheel** to the maximum setting.
16. Set the small **Hi Morph** controls so that another little resonance peak appears next to the one from the lowpass filter. The filter response display should look something like this:

17. Now play the keyboard and turn the **Morph Wheel**. The dual resonance peaks come in as the filter frequency (morph) is turned up, and they sound much more interesting than a simple lowpass.

18. Go ahead and adjust the controls some more, noting the interaction between the Lo/Hi Morph controls and the Morph Wheel. It's really pretty simple. The Morph Wheel interpolates between the Lo and Hi settings of the filter section.
19. If you want to control the Morph from the continuous controllers on your MIDI keyboard, set the Morph Wheel to its **minimum position**. This allows Controller A to have complete control over the Morph parameter.

    (To connect the knobs on your MIDI keyboard to control the Emulator X or Proteus X, see "Assigning Continuous Controllers" on page 13.)

Add Another Section

20. When you're ready go ahead and add yet another filter section. You're on your own now so choose any filter type you want. Using just three of the six sections you can create some truly great sounding filters.

Explore the Morph Designer Templates

21. **Right-click anywhere inside the Filter area.** A pop-up list of Templates appears. Click **More Templates** to view the entire list.
22. **Click on a Template name to select it**, bearing in mind that selecting a template wipe out the current filter settings.
23. If you want to **Save** your filter as a template, choose **Save Filter Template** from this list, then **name it** and click **OK**.
24. There are some really great sounding filters here. Examine the settings of the factory templates to learn a few more tricks.

- **Tip:** Every module in the Voice Processing page has its own set of Templates. Right-click over each module to view the list of saved templates.

12 *Function Generator Applications*

The function generators can be used as note-controlled sequencers that start and stop as you play the keyboard. In this tutorial, we'll show you how to setup a sequence, re-trigger filter envelope, add synchronized echoes, and combine two function generators to create more complex sequences.

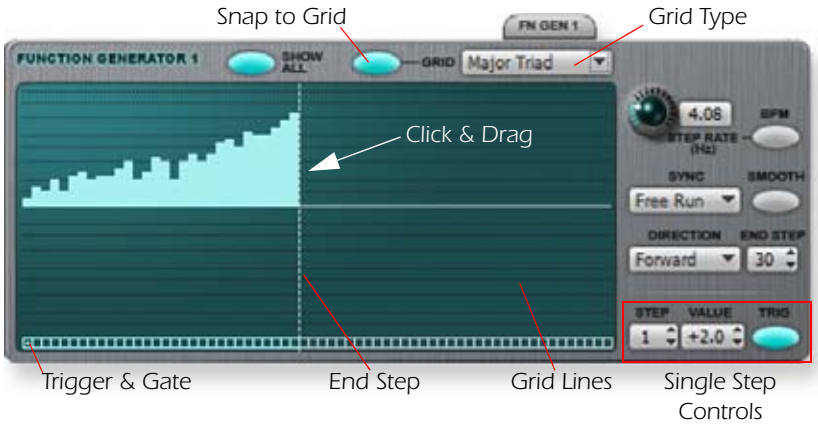
▶ *Using the Function Generator as a Sequencer / Arpeggiator*

Set up

1. Load the Proteus X Composer bank.
2. Select preset **P0289 FP Powerbass** by typing the number into the Single View number field.

Double-click here to find it in the Tree.

3. **Double-click on the preset name.** The Preset Globals page opens and FP Powerbass will be selected in the Tree.
4. **Click on the (+) symbol** (or double-click on the preset name in the Tree) to show the other editing pages.
5. Click the **Voice Processing icon** to open the Voice Processing module.
6. Go to the Patchcord section and click the 19-27 tab. Cord 20 isn't being used, so use it to patch "**Func Gen 1 +**" to "**Pitch**" Set the Cord amount to 100% *(so the grid will play accurate pitches)*.
7. Now click the **Func Gen 1** tab. The screen below appears.
8. Turn on "Snap to Grid" by pressing the **Grid** button.



9. Select **Major Scale** as the Grid Type.

Modify the Sequence & Play

10. Click in the graphic display and begin horizontally dragging the mouse. Notice how the bars snap to the Grid lines.
11. You can change the **End Step** by dragging the dotted line.
12. **Play a key.** Play a chord. Play an arpeggio.

Adjust the Amp Envelope

You'll notice that the sound doesn't sustain very long. This is because the Amplifier envelope doesn't have any Sustain. Let's fix that now.

13. Click the **Amp Env tab** and turn up the **Decay 2 Level** parameter to **100**.

14. Click the **Fn Gen 1** tab again and adjust your sequence until you get something you like.
15. Click and drag the **End Step** line to shorten or lengthen the sequence.

Tip: Hold down the **Alt Key** as you drag across the note display to select random values.

16. Change the **Step Rate** to change the speed of the sequence. The BPM button locks the step rate to a note division of the Master Tempo.

Tip: Turn **Show All** off to zoom in and only display the steps in your sequence.

17. Go ahead and **turn BPM on** and set the Note Value to **16th** notes.

Retriggering the Filter

Now the sequence is sustaining, but it sounds a little dull. We can retrigger the filter envelope with the Function Generator to liven things up.

18. Set up Cord 21 to route Func Gen 1 Trigger -> Filter Env Trigger. Set the Cord amount to any positive value.

19. Turn on the **Function Generator Trig/Gates** for each step in the sequence. (Click the little blue squares to turn the gates on or off.)
20. Now the filter will retrigger with each step. Try turning some gates on and some off to give accents to certain notes.

21. Try adjusting the Filter Envelope to change the sound.
Example: Set the Attack 2 Time to 0.05 sec or try increasing the Decay 2 time slightly. **To Undo:** Press Ctrl+Z, repeat as necessary.

Echo, Echo, Echo...

Adding synchronized echoes is easy since the Function Generator is in BPM mode.

22. Click the Emulator X or Proteus X bank icon Emulator X (Proteus X Composer.exb) above the Tree. The Multisetup page appears.

23. Click the **Aux FX 2 Tab** to reveal that the BPM Delay is assigned to the Aux 2 Bus. This is handy. Now all we have to do is turn up the FX amount.
24. Turn up the **Aux FX 2 Amount** and play the keyboard. Notice how the echoes are synchronized. This is because both the Function Generator and the Delay (BPM) are synchronized to the Master Tempo.
25. **Change the Tempo** now. Everything is locked.

Tip: If the Tempo control is locked, go to **Options, Preferences, MIDI** and uncheck **External Tempo Source**.

26. Feel free to modify the Delay (BPM) settings. You can add Reverb by turning up the Aux 1 amount.

More Fun..ctions

Now we'll add another Function Generator to add complexity to the sequence.

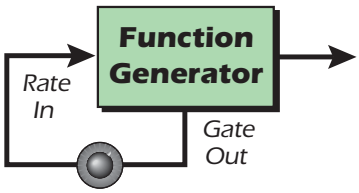
27. Go back to the **Voice Processing** page and click the **Func Gen 2** tab.
28. **Turn BPM on** and set the **Step Rate to 1/2**.
29. Set up Cord 22 to route Func Gen 2 + to Filter Frequency. Set the Cord amount to 50%-100%.

30. Adjust the Function Generator values and length any way you want. You have to re-key the keyboard to hear your changes.

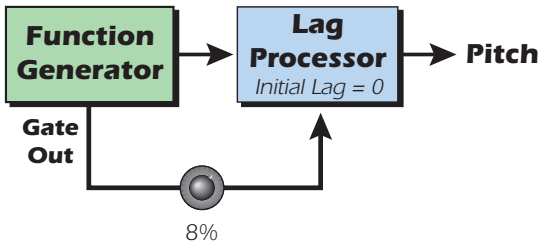
We've only scratched the surface of what you can do with the Function Generators. See the **Voice Processing** chapter in your reference manual for all the gory details.

More Function Generator Ideas

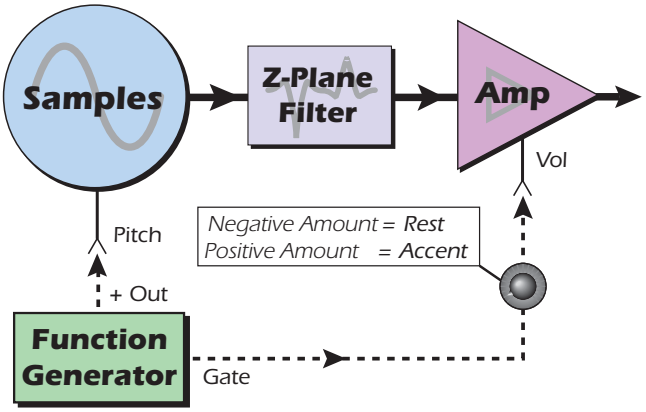
- **Speed Control -** You can slow down or speed up certain notes by routing the Function Generator Gate back to control its own Rate. Positive Cord values speed up the gated notes; negative Cord values slow down gated notes.



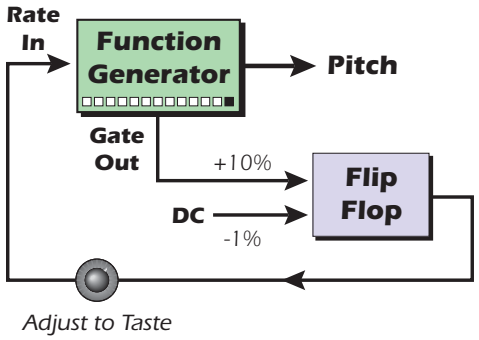
- **Glide Control -** Only notes that have the Gate turned on will glide using this patch. This technique works well for all kinds of music including synth bass lines and adds another element of interest to the sound.



- **Rests and Accents -** You can insert rests and accents onto specific notes using this simple patch. To make a rest, set the amp cord amount negative (turning the amp off).
For an accented note, set the cord amount positive (making the amp louder).

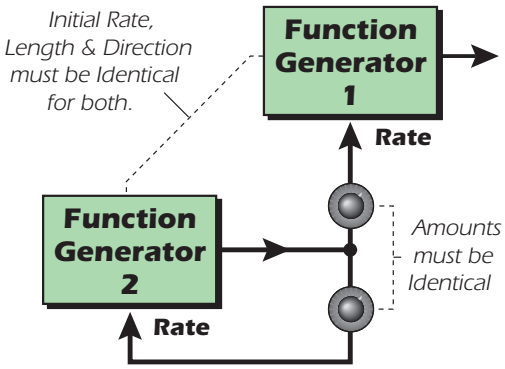


- **Two-Speed Sequence -** This sequence changes rate every other time it plays through. The flip-flop sets and resets every other time it is pulsed with the function generator gate. The Cord amount from the flip-flop controls the amount of speed variation.
  (Note: The -DC Cord is necessary because the flip-flop input needs to go positive from a negative value.)

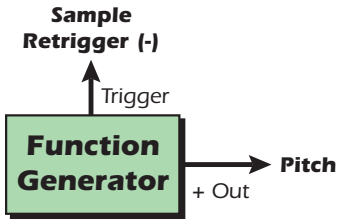


- **Multi-Speed Sequence -** If you want to control the timing for each step in a sequence, two function generators can be used. Function Generator 1 controls the pitch and Function Generator 2 controls the length of each note.

  Two function generators will remain in sync if their initial rate, length and direction are the same, and if the modulation is identical for both.



- **Sample Re-triggering -** The Trigger Out of the Function Generator is ideal for re-triggering samples. In fact, the trigger out can be used just for sample re-triggering without using any pitch control. Use Sample Retrigger (-) to trigger on the note.
  (Remember, samples to be retriggered MUST have a loop.)



Intermediate Lessons

This chapter is packed with useful tip, tricks and other useful information. Any user, from novice to professional sound developer, will be able to find at least one or two new tricks here.

If you don't believe us, just browse through the first lesson and see if you don't learn something. Some of these tips can improve your samples with a click of a single button. *(See "Turn Classic Response Off" on page 55.)* Others features are "hidden in plain sight," but knowing about them will definitely make your life easier and will make programming a lot more fun.

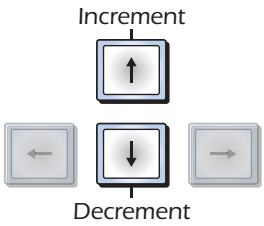
13 Some Things You May Not Know

Here's a list of little tricks that will make your life a lot easier. Sometimes things are hidden in plain sight. These tips were all compiled from the Emulator X and Proteus X pdf manuals, but here they are in one convenient place.

General Navigation

Browsing Presets

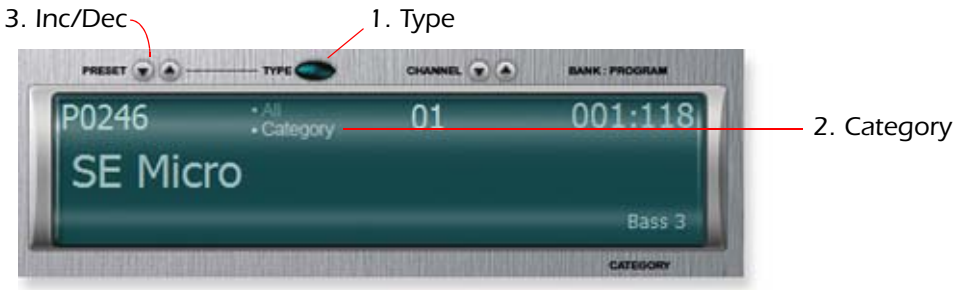
Place the focus on the preset number then use the **Up/Down Arrows** to increment/decrement the presets.



Select a Preset from the Tree

Drag and drop a preset from the tree into the single view screen to select it.

Finding Presets of a Certain Type



1. Press the Type button.
2. Select **Category**.
3. Inc/Dec only through Presets in the selected category.

Jump to a Preset in the Tree

To find a preset in the Tree after selecting it in the single or multi-view, click the Voice Processing shortcut in the Toolbars or press Alt+P. You can also simply double-click the preset name.

Type Preset Names in the Tree

You can type the name of the preset you're looking for in the Tree to find it.

Knob, Slider and Wheel Shortcuts

First place the cursor over the knob, slider or wheel ...

- Use Up/Down Arrows to inc/dec value
- Use the Page Up & Page Down keys increment or decrement by a larger amount.
- Use the Roller on a roller-type mouse to increment or decrement the value.
- Center Control (Pan, etc.) **Alt + Click**
  (Number key 5 also centers a control when Num Lock is off)
- Minimum Setting - **Home**
- Maximum Setting - **End**

Move the Cursor from the Computer Keyboard

- Press the Tab key to move the cursor to the next field.
- Press Shift+Tab to move the cursor to the previous field.

Tree Shortcuts

Expand Folder or Node ..... **Ctrl + R Arrow**
Collapse Folder or Node ..... **Ctrl + Left Arrow**
Move Up Through Items ..... **Up Arrow**
Move Down Through Items..... **Down Arrow**

Other Shortcuts

Go to Preset Globals View..... **Alt + G**
Go to Voice/Zones View ..... **Alt + V**
Go to Links View ..... **Alt + L**
Go to Voice Processing View..... **Alt + P**

Voices & Zones

Multiple Selection

Multiple selection works for any Voices and Zones operation. Select multiple voices, then change a parameter on all of them.

Example: To Mute or Solo Multiple Voices

1. Select the desired voices (Shift or Ctrl-click), then press the **Mute or Solo** buttons at the bottom of the page.
2. To quickly remove all solos and mutes, select **Clear All Solos and Mutes** from the Preset menu.

Voice Processing

Voice Processing Template

You can save the entire Voice Processing window as a template.

1. Set the voice parameters the way you want.
2. Select **Voice Processing Templates** from the Voice Processing menu.

Function Generator Key Tricks

Ctrl Key..... Constrains to vertical dragging only. Useful for setting levels.

Shift Key... All levels are set to the same value, resulting in a horizontal line. *This also works for the trigger outputs, turning them on or off.*

Alt Key..... Values are randomized when this key is held down while dragging. *This also works for the trigger outputs.*

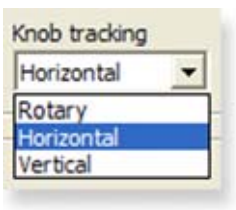
To Create a standard ADSR Envelope

Set the “2” levels the same as the “1” levels and set all the “2” rates to 0.

Change the Action of the Rotary Knobs

If you don’t like the action of the Rotary knobs in the application, try changing the response.

1. Select **Options** from the Toolbar, then select **Preferences.**
2. Choose the **Other Settings** tab.
3. Select **Rotary**, **Horizontal** or **Vertical** tracking.
4. Click **OK**.



Turn Classic Response Off

TRY THIS! The Classic Response button, located in the Amplifier section of the Voice Processing page, allows presets created for the Emulator IV to sound the same on the Emulator X and Proteus X. However, the amplifier response on the Emulator X/Proteus X has been vastly improved. Turn Classic Response OFF for more natural volume response from envelopes and other controls.

Other Tricks

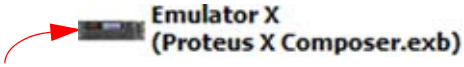
Capture MIDI Controllers

You can capture the state of all your MIDI input device's MIDI controllers, and place the settings in the Initial Controllers section of the Preset.

1. **Go to the Preset Globals window** for the preset you want to apply your current MIDI state.
2. **Make any desired changes to any MIDI controllers** on your MIDI input device, or in the Multisetup window. (You have to turn each knob you wish to save.)
3. From the Preset menu, select **Capture MIDI Controllers.**
4. To keep these settings, you can **Save the Preset**.

Import .Wav or .AIFF

Drag & Drop the file over the Emulator/Proteus Icon above the Tree.



Build a New Bank

1. Select the **System tab** of the Tree.
2. **Find the desired bank** of material on your hard disk.
3. **Open the bank**, then **open the Presets folder**.
4. Audition presets by **Right-clicking**.
5. **Drag & Drop** presets over Emulator/Proteus Icon above the Tree.

Floating Keyboard Velocity

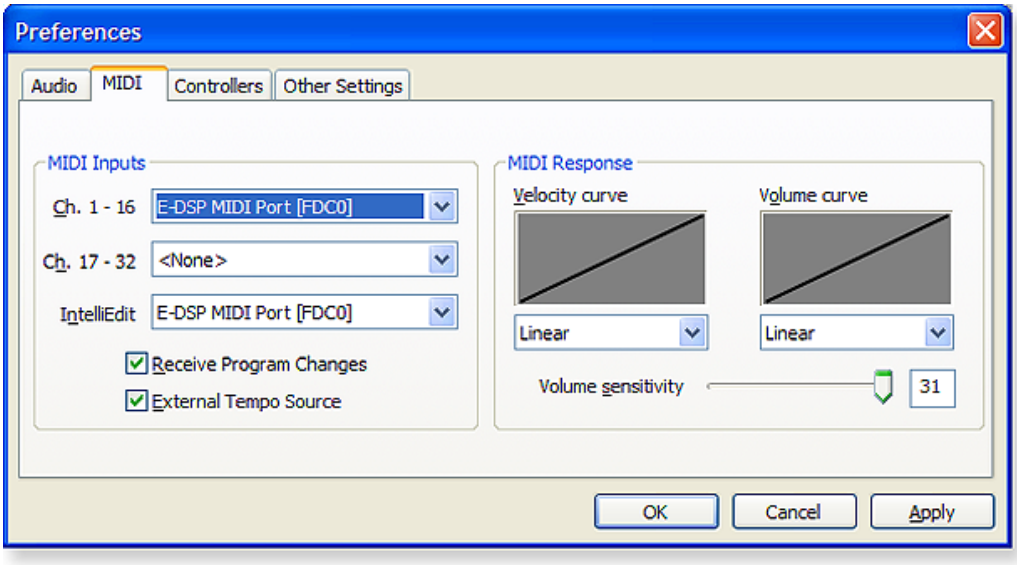
The pop-up floating keyboard normally outputs a velocity of 64, but it can also output two other velocity values.

1. Hold **Ctrl** and play the mini keyboard for a velocity of 10.
2. Play the mini keyboard while holding **Shift** for a velocity of 127.

14 *Find that Voice using Intelliedit*

This slightly hidden feature makes it easy to find out which voices are assigned to which keys and also allows you to edit key ranges using the keyboard.

First, make sure Intelliedit is enabled and set to the same MIDI port your keyboard is using (Options, Preferences, MIDI).



▶ *To Find out which Voices are Assigned to a Key:*

1. Go to the Voices & Zones page.
1. Press and hold **Ctrl+Alt** on your computer keyboard.
2. Play a key on your MIDI keyboard. The voices assigned to that key will be highlighted in red.
3. Play the key again. If multiple voices are assigned to the key, they will be highlighted with repeated pressings of the same key.

▶ *To Select a Key Range using Intelliedit:*

1. In a Voices and Zones page such as “Key Window”, position the cursor inside one of the Key Range fields (Low or High).
2. Press and hold **Ctrl+Alt** on your computer keyboard.
3. Play a key on your MIDI keyboard. The key range will be edited.
4. To select multiple voices you must use the **Group** feature.

15 *Streamline Your Banks*

Many people use the Proteus X and Emulator X like a ROM-pler with one huge bank containing hundreds of presets. This is certainly a valid way to use the software and one that we've promoted by shipping banks such as the Proteus X Composer. However, loading and saving large banks takes time, which can be annoying when you're trying to get work done. This method is also wasteful of system memory since every sample has to have its pre-roll loaded into RAM.

The alternate "sampler" approach consists of auditioning and merging only the sounds you need for a project. This method is great for keeping load and save times short and doesn't waste memory, but is somewhat less convenient than having everything on-line all the time.

Here's a way that you can have the best of both worlds. It works like this. When composing your song, you load the big ROM-pler bank, then create your Multi-setup with the presets you need for the song. When the basic song tracks are laid down, you can **Export the Multisetup**. This creates a new bank containing ONLY the Presets assigned in the Multisetup. Now you have a nice small bank to work with, but you began with all the sounds in the bank at your disposal. If you need more presets, simply audition them from the hard disk and load as needed.

▶ Export the Multisetup:

1. Load the large bank of your choice, which will serve as your sound palette.
2. Assign the sounds you want on each MIDI channel in the Multisetup.

3. When you're ready to streamline, select **Export...** from the Multisetup menu. A new bank will be created containing only the presets and samples needed for your project.

16 *Channel Conservation Using the Poly Key Groups*

If you watch the channel meter at the bottom of the screen while playing the same chord over and over, you'll notice that a lot of channels are being assigned to play that one chord. The Poly Key Group feature places a fixed limit on the number of voice channels that can be played by a single keyboard key.

The Poly Key Group feature is designed for building more efficient presets from the ground up, but if you have an existing preset which seems to be consuming too much polyphony, you can try this feature which will free up voice polyphony in most cases.

▶ To Conserve Voice Channels using Poly Key Groups:

1. Select the preset and **Duplicate** it.
2. Using the Copy, go to Voices and Zones and **Select All**.
3. Go to Voice Processing and set the Assign Group to **Poly Key 2A** (or Poly Key 1A).
4. Play the preset—if it sounds too dry— change the setting to **Poly Key 3A**.
5. Go to the original preset and **play C3** over and over while watching the voice display at the bottom of the screen.
6. Do the same with your new preset to see the polyphony savings and make sure that you haven't altered the sound of the preset in a negative way. Experiment!
7. **Save** the Bank.

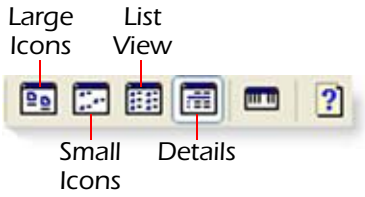
17 *Preset and Sample Categories*

Organizing your sound library is probably one of the most important things you can do to improve your productivity. Being able to find just the right sound when you need it will help keep you in the creative zone. As your sound library grows, it will become harder and harder to find the right sound. Fortunately, the Emulator X and Proteus X contain a built-in librarian and category system.

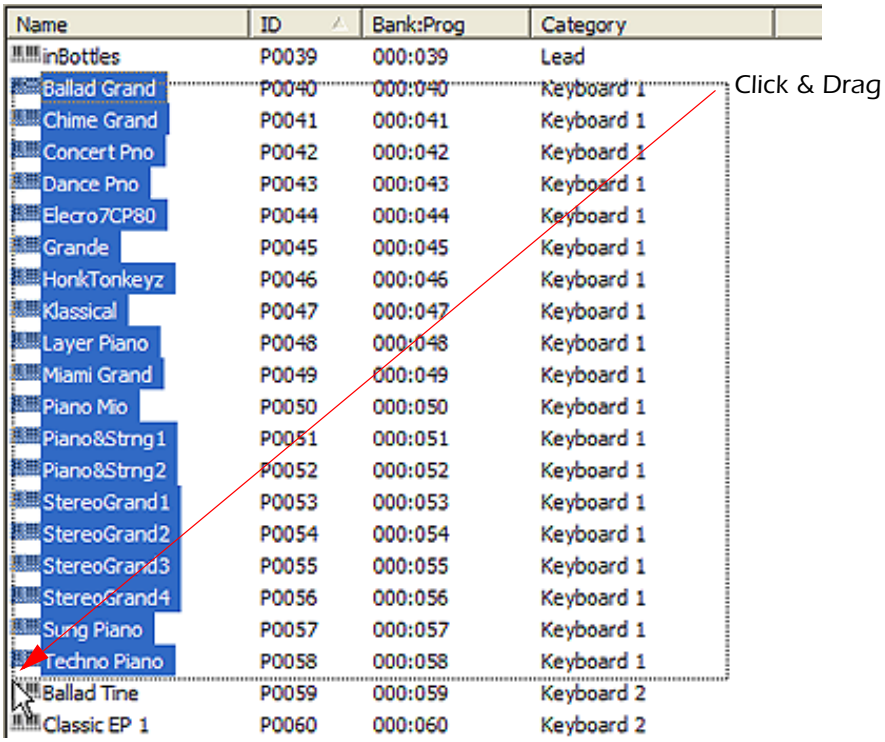
Although the E-MU factory libraries are already categorized, you may want to use your own category system that better suits your needs and work methods. With this tip, we'll show you how to change the categories of your Presets and Samples quickly and easily.

▶ To Change the Category of a Group of Presets or Samples:

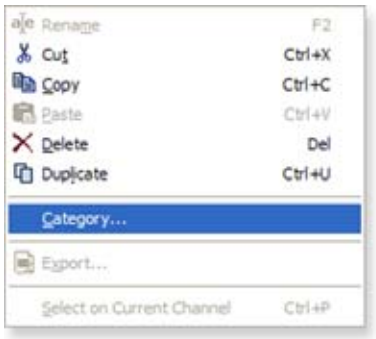
1. **Load the bank of presets** you wish to modify.
2. Click on the **Presets folder** in the Tree. The complete list of presets is shown in the main display area.
3. The View buttons in the toolbar allow you to display the item in the following ways: Large Icons, Small Icons, List View, or Details. If not already selected, **choose Details** to view the Preset Categories.



4. Suppose you wanted to rename the category of the **Keyboard 1** presets to **Piano**? First, **select the presets** by clicking and dragging a selection box around them.

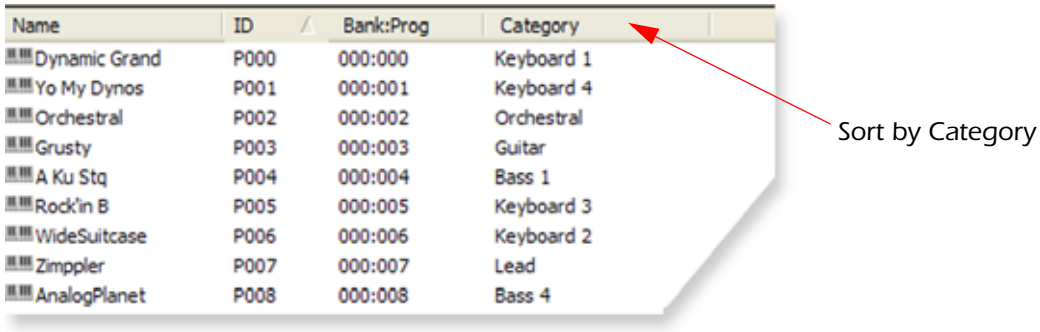

Name
ID
Bank:Prog
Category
inBottles P0039 000:039 Lead
Ballad Grand P0040 000:040 Keyboard 1
Chime Grand P0041 000:041 Keyboard 1
Concert Pno P0042 000:042 Keyboard 1
Dance Pno P0043 000:043 Keyboard 1
Electro7CP80 P0044 000:044 Keyboard 1
Grande P0045 000:045 Keyboard 1
HonkTonkeyz P0046 000:046 Keyboard 1
Klassical P0047 000:047 Keyboard 1
Layer Piano P0048 000:048 Keyboard 1
Miami Grand P0049 000:049 Keyboard 1
Piano Mio P0050 000:050 Keyboard 1
Piano&Strng1 P0051 000:051 Keyboard 1
Piano&Strng2 P0052 000:052 Keyboard 1
StereoGrand1 P0053 000:053 Keyboard 1
StereoGrand2 P0054 000:054 Keyboard 1
StereoGrand3 P0055 000:055 Keyboard 1
StereoGrand4 P0056 000:056 Keyboard 1
Sung Piano P0057 000:057 Keyboard 1
Techno Piano P0058 000:058 Keyboard 1
Ballad Tine P0059 000:059 Keyboard 2
Classic EP 1 P0060 000:060 Keyboard 2
Click & Drag

5. **Right-click** over the area highlighted in blue. The pop-up menu shown at right appears.



6. Select **Category** and the category selection dialog box appears. Select the desired category from the list or type in a new category name.

7. **Click OK.** The selected presets now belong to the new category.
8. The Category buttons at the top of the window allows you to sort the presets. Click on the **Category** name to sort alphabetically by the category names.



9. **Save the Bank.** Otherwise, your work will be lost.

Change the Category of Samples

10. Changing the category of samples works exactly the same way except that you **select the Samples folder** to view the sample list in the main section area.

Organize Your Sounds

You probably have a pretty good idea about the best way to organize your library. The category system can be a really useful feature if you put it to work for you.

18 Using an External Editor

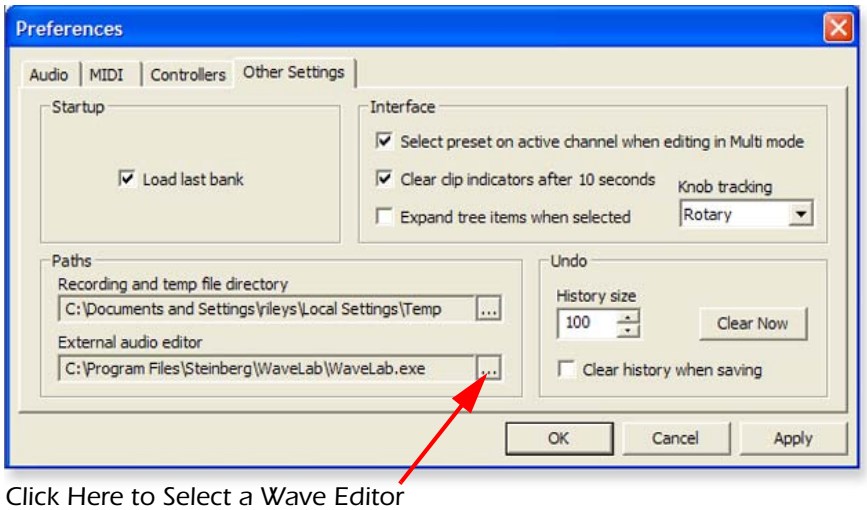
When editing your audio samples, you have the choice of using the sample editor built-in to the Emulator X or using a third party sample editor such as Steinberg Wavelab, or Sony Sound Forge. While the Emulator sample editor is perfect for quick editing, looping and its unique DSP, you may want to use an external editor to make use of VST plug-ins and other processing.

It's simple to invoke the sample editor of your choice from the sample editor window. The external editor opens with the current sample loaded and after editing, the sample is automatically returned to the Emulator X sample editor window.

▶ To Set Up and Use an External Sample Editor:

Choose the Editor Path

1. From the **Options** menu in Emulator X, choose **Preferences**.
2. Click the **Other Settings** tab.



Click Here to Select a Wave Editor

3. **Click on the box** ... to the right of the External Audio Editor field to browse for your Wave editor. The **Locate Audio Editor** dialog box appears.
4. Locate the sample editor (.exe) you wish to use and click **Open**.
5. **Click OK** to save the preferences.

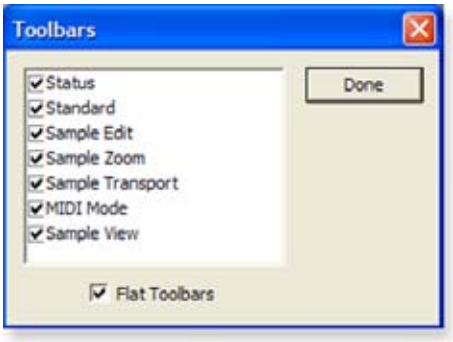
Invoke the External Sample Editor

The External Sample Editor can **only** be invoked from the Sample Edit menu. With a sample displayed in the Sample Edit menu, do one of the following:

- **Click the icon** in the Sample Edit Toolbar.
- Select **External Edit** from the **Sample Edit menu pull-down**.
- Hit **Ctrl+E** on your computer keyboard.

▶ Try it out

1. Open any bank.
2. **Select a sample** from the samples folder in the Tree. The Sample Editor page appears.
3. **Click the icon** in the toolbar.
   - If this icon isn't visible, select **Toolbars**, from the **View** menu and check the **Sample Edit box**.
4. The External Editor you selected launches with the current sample open.
5. Edit the sample using the external editor. When finished, click the close box to exit the editor application.



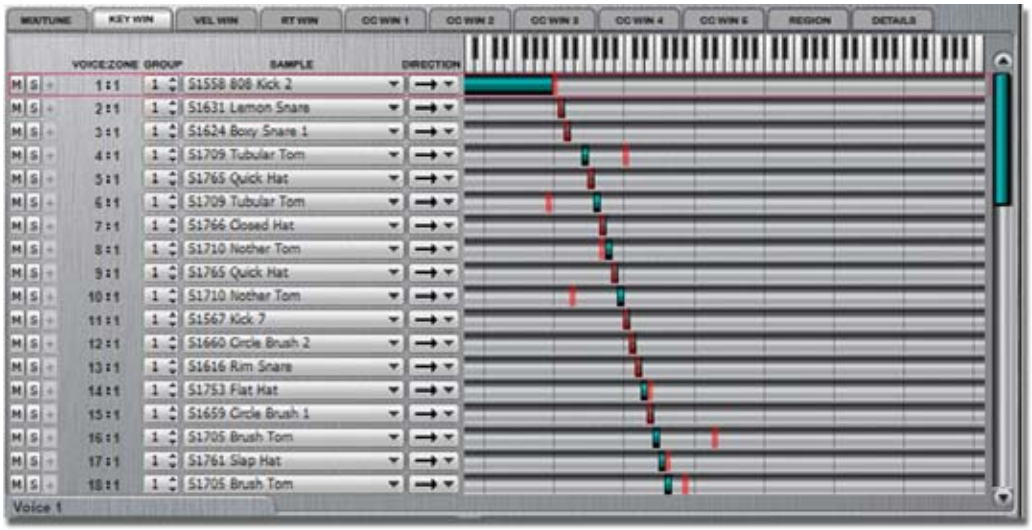
6. The external editor asks you if you wish to Save. **Choose Yes.**
7. The external editor closes and the edited sample is returned to the Emulator X sample editor.
8. That's it!

19 *Customizing a Drum Kit*

When using the factory drum kit presets, you might find a kit you really like, except for a maybe one of two of the sounds. No problemo. Using either the Emulator X or Proteus X it's super easy to create your own custom drum set.

▶ To Customize a Drum Preset:

1. **Load the Bank** containing the drum kit you want to modify. For the purposes of this example, we'll load the **Proteus X Composer** bank.
2. **Open Kit1** (preset 009) from the Tree and select the **Voices & Zones** page.
3. Select the **KEY WIN** tab to show the key mapping of each drum.
4. On your MIDI keyboard, play the key of the drum you want to replace while **holding down Ctrl+Alt** on your computer keyboard.
5. The voice you played will be highlighted in red in the Key Window. For this example, let's swap out the 908 Kick1 on Voice 1.



- **Note: If the voice you played does NOT highlight,** make sure Intelliedit is enabled and set to the same MIDI port your keyboard is using (Options, Preferences, MIDI).

Method 1: Inc/Dec

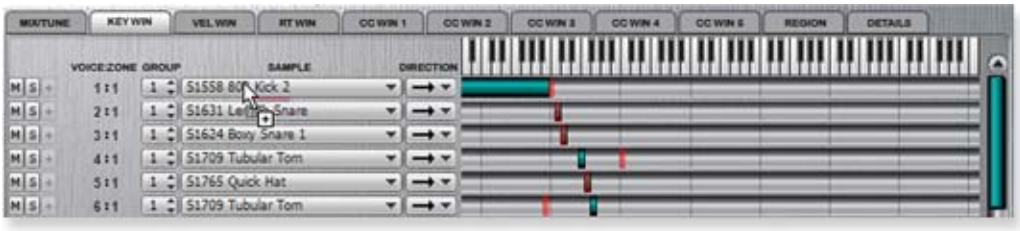
6. **With the Voice highlighted** as in the screen above, you can increment or decrement through the samples using the **Up/Down keys** on your computer keyboard.
7. Play your MIDI keyboard to hear the sounds. Since the kick drums are grouped together in the list, you can audition them all quickly.

Method 2: Picking Samples from the Tree

8. Go to the **Samples folder** in the Tree to find a better kick drum. In this bank, the kicks go from S1545 to S1599.
9. **To Audition**, select the sound in the Tree, Right-click the mouse and select **Audition**

- **Note:** You can also select the sample, then hit the space-bar to audition, but this method jumps you to the Sample Editor and loses your place in the Voices & Zones window.)

10. When you find the drum you want in the Tree, **click and drag the sample over the sample name** in the Key Window. Release the mouse button and the new sample replaces the old one.



Method 3: Search your Entire Library for Drums

11. Select the **Library tab** below the Tree.
12. Type “Kick” in the **Filter By Name** box, then click **Search**.
13. Audition the sounds by selecting them and hitting the **Space-Bar**.
14. When you find the sound you want, **click the Voices & Zones icon** in the Toolbar. The Voices and Zones page pops back into view.
15. **Click and drag the sample over the sample**, as shown in the screen above to replace it.

Continue to Customize your Drum Kit

16. **Save the Bank**. Choose **Save As...** if you want to keep the original bank intact, or **Save** to overwrite the existing bank with your new drum kit.

- **Tip:** Use this technique to create a custom General MIDI sound set.

20 *Double Drum Speed using the "Up" Layer*

When sequencing drums, it can be difficult to play the keyboard fast enough for the part. This handy little trick makes is twice as easy by placing a copy of the voice on a key-up layer. This way you get two drum hits on each key press, making it easy to do fast runs and drum rolls.

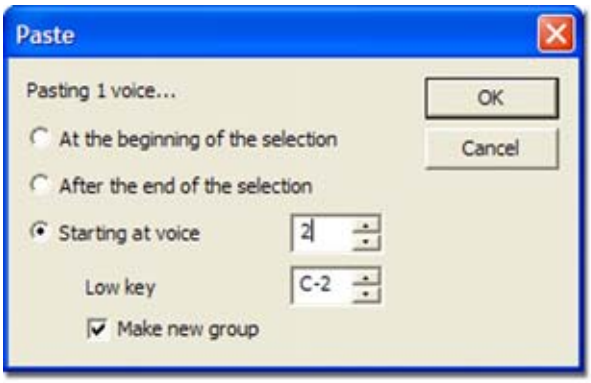
▶ To Double a Drum on the Up Layer:

1. Choose the drum you wish to double. In this example we'll use **P0009-Kit1** from the **Proteus X Composer** bank.
2. Open Kit1 from the Tree and select the **Voices & Zones** page.
3. In this example we'll double Voice 3- Boxy Snare 1**.** Select **Voice 3 - Boxy Snare 1** so that it is outlined in red.

- To find out which voice you are playing on the keyboard, **press and hold Ctrl+Alt then play the keyboard key.** The voice you are playing will be highlighted in red on the Voices & Zones page. *(Note: Intelliedit must be enabled in the Options, Preferences menu.)*

Duplicate the Voice

4. Select **Copy** from the Edit menu or by pressing **Ctrl+C**.
5. Select **Paste** from the Edit menu or by pressing **Ctrl+V**. The following popup dialog box appears:



6. Select "After the end of the selection", then click **OK**. Boxy Snare 1 will now be duplicated in the voice 4 location.

Program the Voice for Key-up Triggering

7. **Select the Voice Processing page** from the Tree. Notice that only Voice 4 is selected in the Voice Selector.
8. Select **Poly Rel Trig/Note Vel** *(or Poly Rel Trig/Rel Vel if your keyboard supports release velocity)* key mode. This control causes the voice to trigger on a key-up instead of a key-down.
9. Play your double-drum on the keyboard (D1).

21 *Creating a Drum Machine using Cubase*

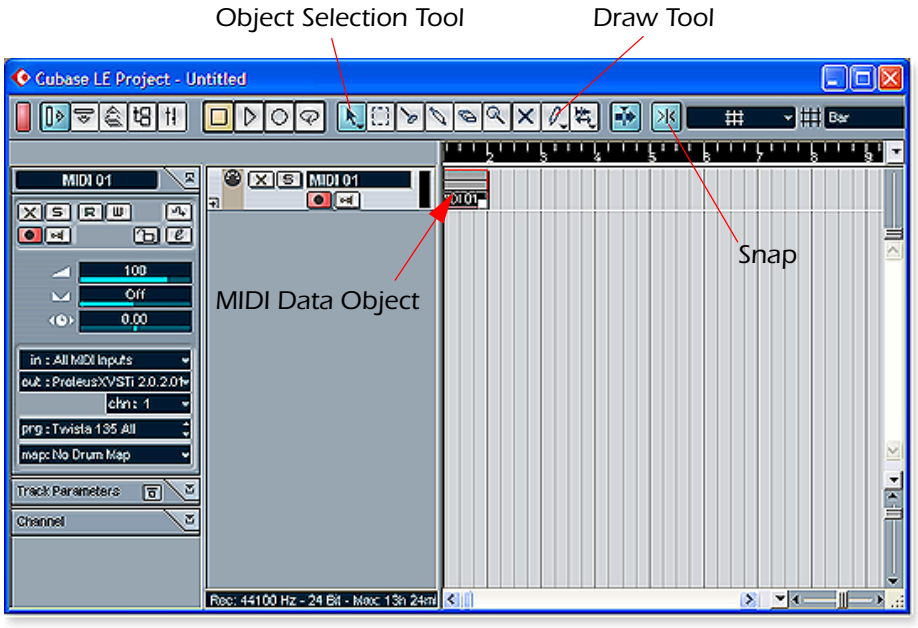
Wouldn't it be nice to have some realistic sounding drums while you jam or lay down audio tracks instead of a sterile metronome? The Twistaloop features of Proteus X2/Emulator X2 make it easy to create your own drum machine that can track tempo changes. (If you'd rather use Sonar, see page 70.)

You can use the **TwistaLoop Xperience bank** for this example, or alternatively a bank containing complete drum parts that can be beat-analyzed. Drum patterns are available from a variety of sources on the internet and elsewhere. (**Note:** To use third-party drum loops you'll need the Beat Analysis features of the Emulator X2.)

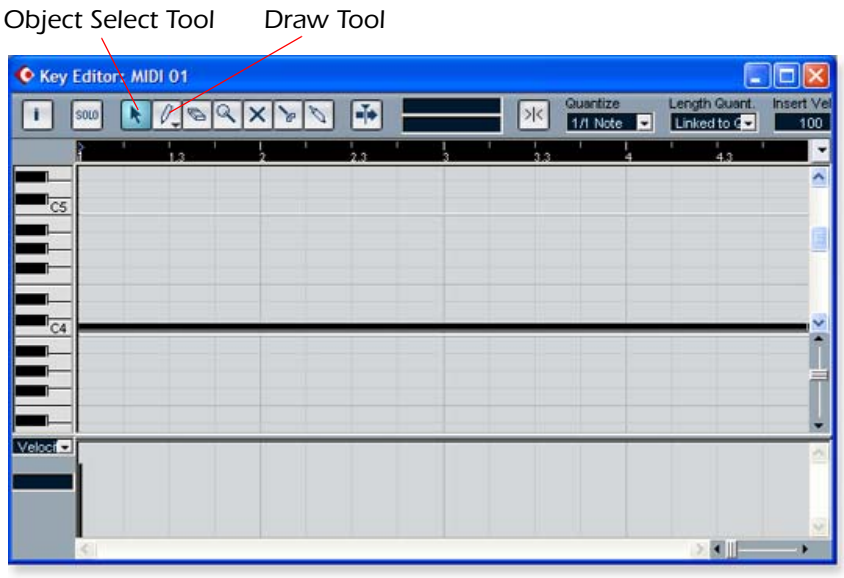
The basic idea of this tip is to create a sequence that will trigger Emulator X or Proteus X at the start of each measure. If the drum track has been beat-analyzed, and Twistaloop is on, the drums will lock to the sequence independent of tempo.

Create a Drum Trigger Track

1. Open Cubase and create a **New Project**.
2. **Add a MIDI track**.
3. Make sure **Snap is On**.
4. Create a MIDI Data Object by selecting the **Draw Tool** and clicking once in the first measure of the track. You'll end up with a MIDI data object, which looks something like one shown below.



5. Select the **Object Selection Tool,** then **Double-click inside the MIDI data object** to open the MIDI Key Editor window.



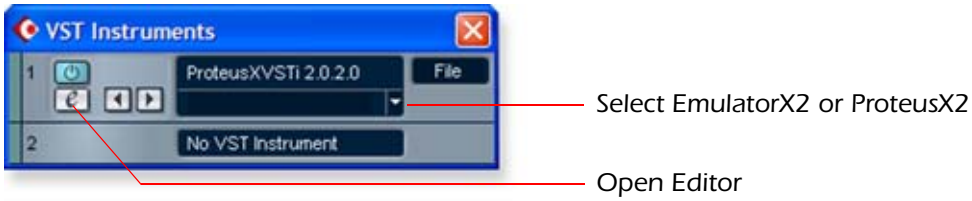
6. **Select the Draw Tool** and draw a note that takes up the entire measure (a whole note), as shown above. If the note you drew isn't exactly one whole note, you can edit the length by selecting the **Object Select Tool** and dragging the ends of the note.
7. **Select the note** you just drew using the Object Select Tool. The note should be black.
8. Select **Repeat** from the File menu and repeat the note **50 times** or as long as you want the song to last. Press **OK**.

9. **Close the Key Editor** by clicking on the close box.
10. **Extend the length** of the MIDI Data Object by clicking on the box in the lower right and then dragging to the right. Keep dragging to the end of the MIDI notes.

11. **Save** the Project.

Open Emulator or Proteus as a Virtual Instrument

12. Select **VST Instructments** in the **Devices** menu.



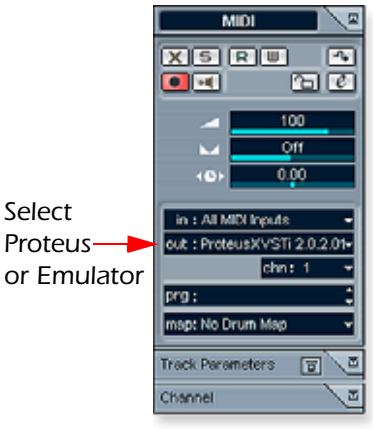
13. Select **Emulator X** or **Proteus X** as the Virtual Instrument.

14. Open the Emulator X or Proteus X by clicking the **Editor** button.

15. Open the **Twista Mania** bank from the File menu. If you don't have the Twistaloop Xperience bank, load a bank of drum loops and perform Beat Analysis on each sample. See the Emulator X2/Proteus X2 operation manual for full details on Twistaloop.
16. **Turn Twistaloop Override on**, as shown in the screen shot above.
17. The **Tempo** control should be "greyed-out" as shown in the screen shot above. If not, go to **Options**, **Preferences**, **MIDI**, and select **External Tempo Source**. This will allow Cubase to control the Twistaloop tempo.

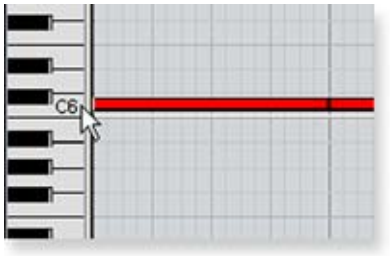
Set up the Virtual Instrument

18. Turn on **Show Inspector** if it's not already on. The track inspector panel (shown at right) appears.
19. **Select Proteus X or Emulator X** as the MIDI track output (as shown at right).
20. Make sure the MIDI channel matches the channel on Proteus X or Emulator X.
21. **Press Play** on Cubase. If your MIDI note is in the range of C1 to C6, you should now be hearing sound.



Change the Drum Pattern

22. **Open the Key Editor** by double-clicking inside the MIDI object.
23. **Turn Autoplay Off**. (You may have to expand the Key Editor window to see the icon.)
24. **Ctrl + Click** on the vertical keyboard next to your MIDI track as shown at right. The MIDI events turn **black** indicating that they are selected.



25. Press **Play** (space bar) on Cubase and use the **Up/Down arrow keys** on your computer keyboard to move the events to different MIDI keys. This is how you select different drum patterns.
26. Because Twistaloop is on, you can change the tempo and the drums will stay in time.

Record an Audio Track

27. When you find a pattern you like, simply add an audio track and start recording. It's much more inspiring to play with a real drum track, rather than the click-click of the metronome.

Going Further

If you have drum tracks that are separated into their component parts (bass drum, snare, hi-hats, etc.), you can create MIDI tracks for each different part and then mix and match parts (i.e. take the bass drum from one pattern and combine it with the snare of another).

The Command Station sound set from the E-MU library is perfect for this kind of drum part creation. There are also many other commercially available drum groove collections which are applicable to this technique.

22 Creating a Drum Machine using Sonar

This tutorial is a repeat of the previous lesson for the **Sonar** people out there. It shows you one way to use realistic sounding drums as a metronome while jamming or laying down basic tracks. The Twistaloop features of Proteus X2/ Emulator X2 make it easy to create your own drum machine that can track tempo changes.

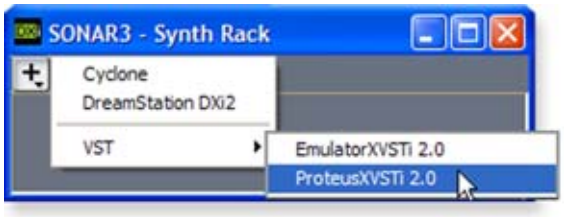
You can use the **TwistaLoop Xperience bank** for this example, or alternatively a bank containing complete drum parts that can be beat-analyzed. Excellent drum patterns played by professional drummers can be found on the internet and elsewhere. (**Note:** To use third-party drum loops you'll need the Beat Analysis features of the Emulator X2.)

The basic idea of this tip is to create a sequence that will trigger the Emulator or Proteus at the start of each measure. If the drum track was beat-analyzed and Twistaloop is on, the drums will lock to the sequence independent of tempo.

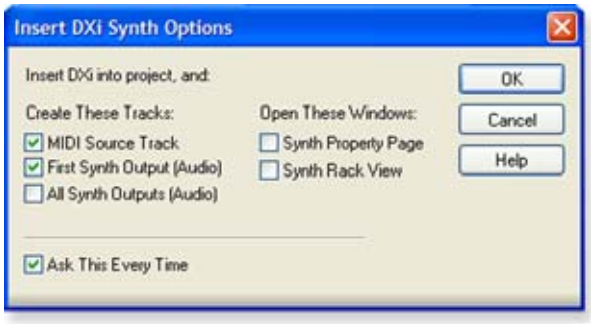
Create a Drum Trigger Track

1. Open Sonar and **create a new Project**. The Track View window appears.
2. Select **Synth Rack** from the **View** menu.

3. **Click on the + symbol** and insert the Emulator X or Proteus X as a DXi.

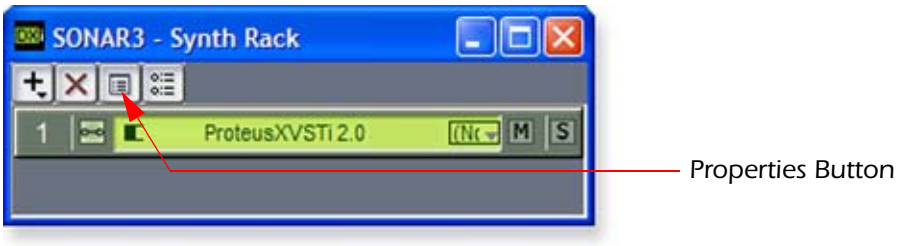


4. A popup dialog box appears as shown below. **Click OK**.

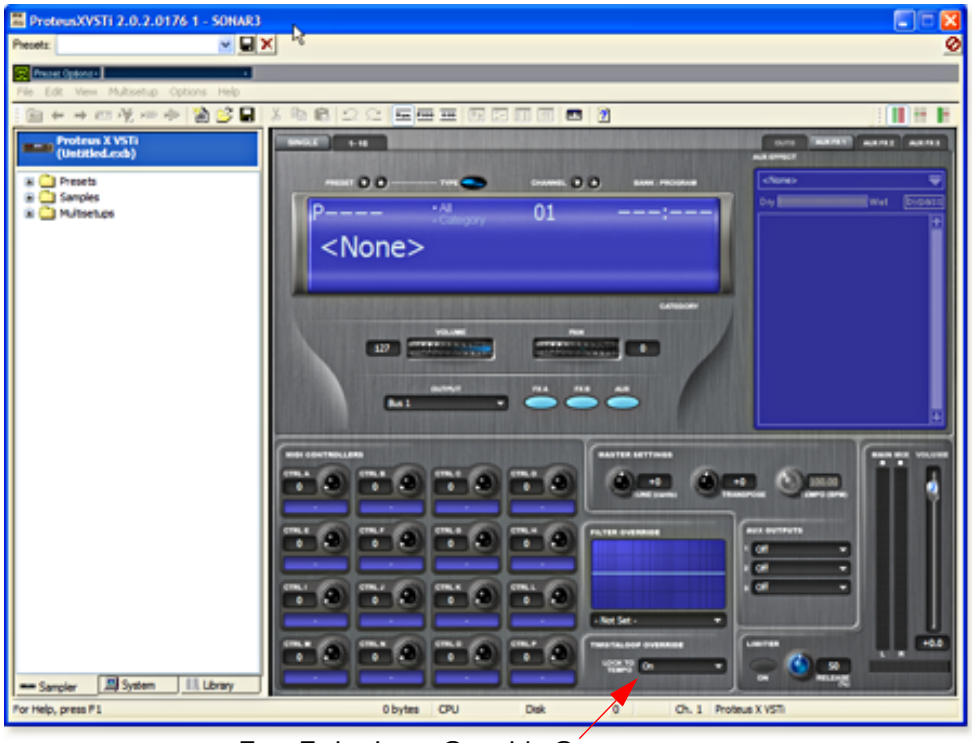


Note: If you get an error message stating that the VSTi could not be inserted, you may have to run the **Cakewalk VST Adapter**. Select and run this application from the **Windows**, **Start** menu.

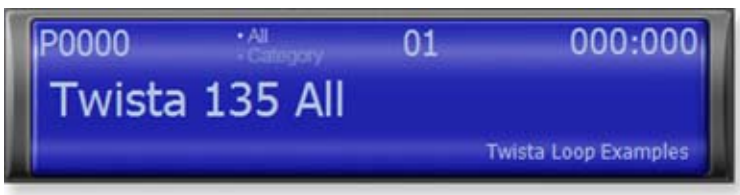
5. The ProteusXVSTi or EmulatorXVSTi now appears in the Synth Rack and a MIDI track has been added to the Track View window.



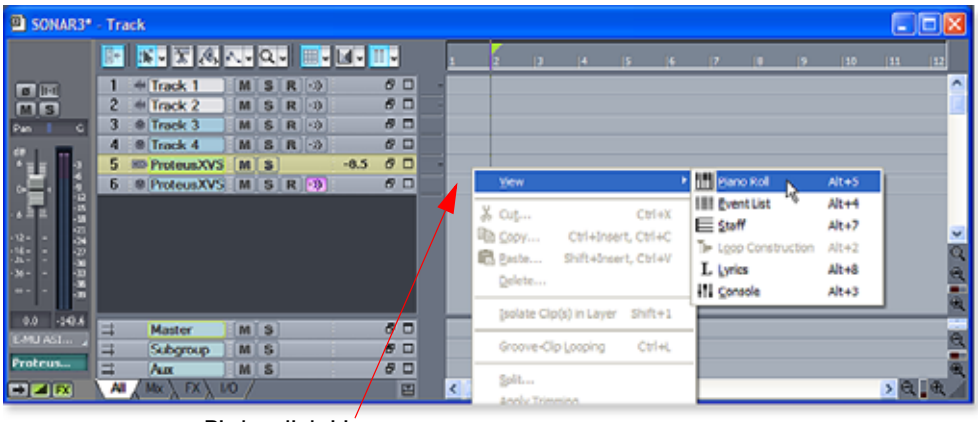
6. Click on the **Properties** button to open Emulator X or Proteus X.



7. Before the Proteus X or Emulator X can play, you must load a bank of sounds. Select **Open** from the **File menu** on Proteus X or Emulator X.
8. Select **Twista Mania** or any other bank of drum loops.

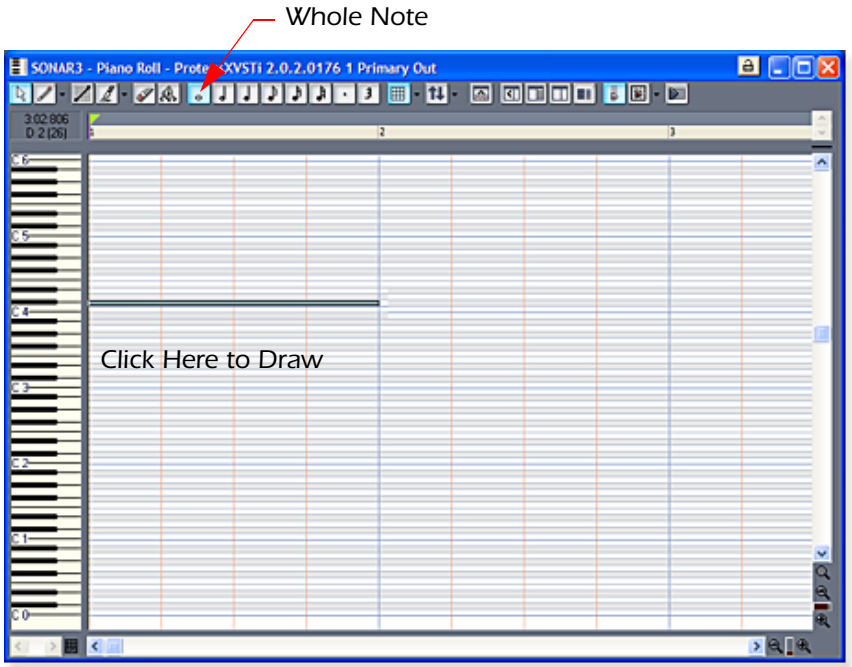


9. **Turn Twistaloop Override on**, as shown in the Proteus screen shot.
10. The **Tempo** control should be “greyed-out” as shown in the Proteus screen shot. If not, go to **Options**, **Preferences**, **MIDI**, and select **External Tempo Source**. This will allow Cubase to control the Twistaloop tempo.
11. Close the Proteus X or Emulator X editor by clicking on the Close box.
12. **Right-click on the MIDI Track** that was just added to the Track View. Select **View** and then **Piano Roll** (or select the track and press **Alt+5**).

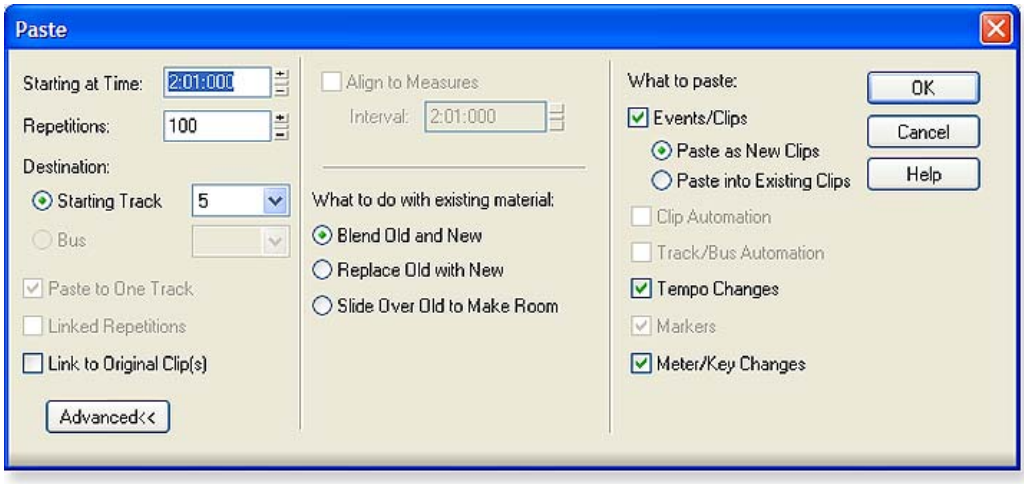


13. The Piano Roll window appears as shown below. Select **Whole Note** for drawing.

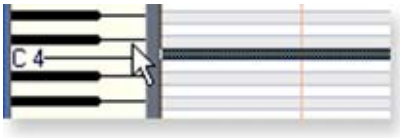
Tip: To make Sonar’s Piano Roll match the note settings in Proteus X or Emulator X, go to **Options**, **Global**, **General**, and set the **Base Octave for Pitches** to **-2**.



14. **Select the Pencil Tool** and then **click inside the note area** to add a whole note to the first measure. In the example above we've chosen note C4.
15. Click the **Select Tool** , then click on the whole note you've just drawn to select it. When selected, it turns a darker shade of grey.
16. Select **Copy** from the **Edit menu**. A popup dialog box appears. Press **OK**.
17. Select **Paste** from the **Edit menu**. The following dialog box appears.



18. Change the **Starting Time** to **2:01:00**.
19. Set the number of **Repetitions** for as many measures as you want the song to last, say **100**.
20. **Press OK**. You'll end up with a very long stream of whole notes, lined-up exactly on the bar lines.
21. **Save** the Project (Ctrl+S).
22. **Control-click the Vertical Keyboard note** where you have placed your line of whole notes. This selects all the MIDI events on that note. The MIDI events turn **dark**, indicating that they are selected.



23. In Sonar press **Play** (space bar). The track begins playing.

Change the Drum Pattern

24. Use the **Up/Down arrow keys** (8 & 2)on the 10-key pad of your computer keyboard to move the events to different MIDI keys. This is how you select different drum patterns.
25. Because Twistaloop is on, you can change the tempo in Sonar and the drums will stay in time. (Make sure "External Tempo Source" is On in Proteus X or Emulator X.)

Record an Audio Track

26. When you find a pattern you like, simply select one of the audio tracks and start recording. It's much more inspiring to play with a real drum track, rather than the sound of the metronome.

Going Further

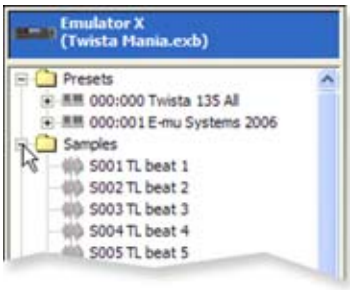
If you have drum tracks that are separated into their component parts (bass drum, snare, hi-hats, etc.), you can create MIDI tracks for each different part and then mix and match parts (i.e. take the bass drum from one pattern and combine it with the snare of another).

The Command Station sound set from the E-MU library is perfect for this kind of drum part creation. Many of the commercially available drum collections are applicable to this technique.

23 *Using TwistaLoop & the Xploder*

For the purpose of this tutorial we're using the Twista Mania bank as the source of drum beats. If you have another drum part you'd rather use, go ahead and use it.

Grab a Beat

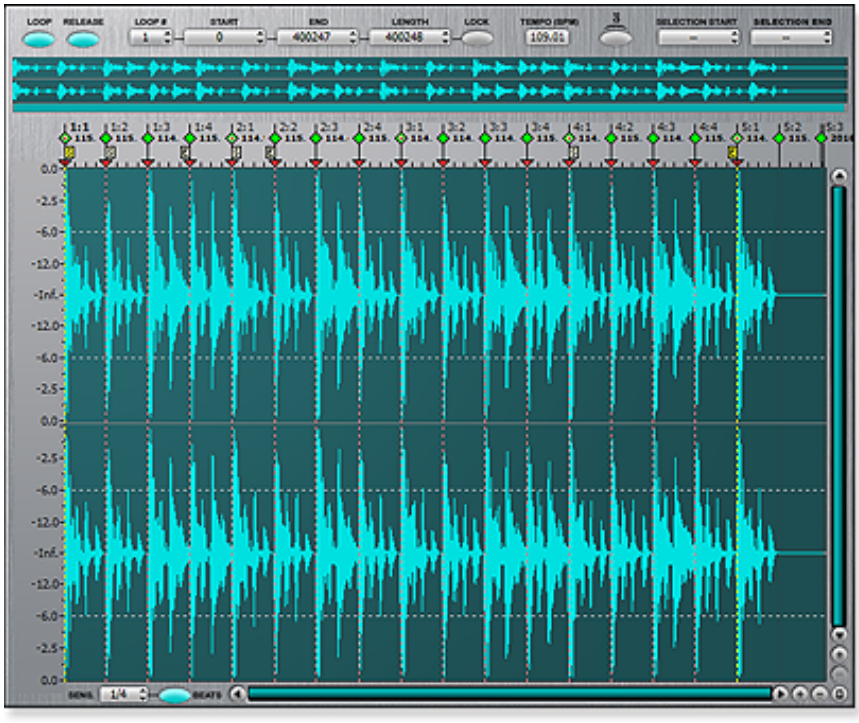


1. Start by loading the **Twista Mania bank**.
2. Open the Samples folder and select **S001 TL Beat 1**, the first sample in the list.
3. The Sample Editor window opens with our sample displayed.

Clear the Beats

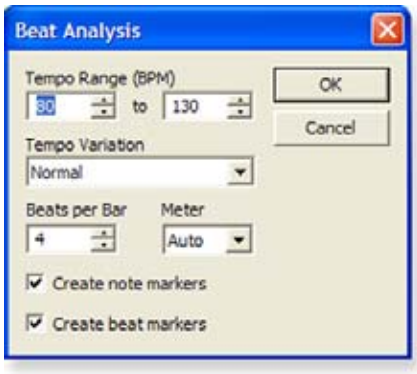
We need to undo the beat analysis so you can do it yourself. If you're using your own drum part, you can skip the next three steps.

4. Notice that the sample has already been Beat-Analyzed. Let's undo that now.

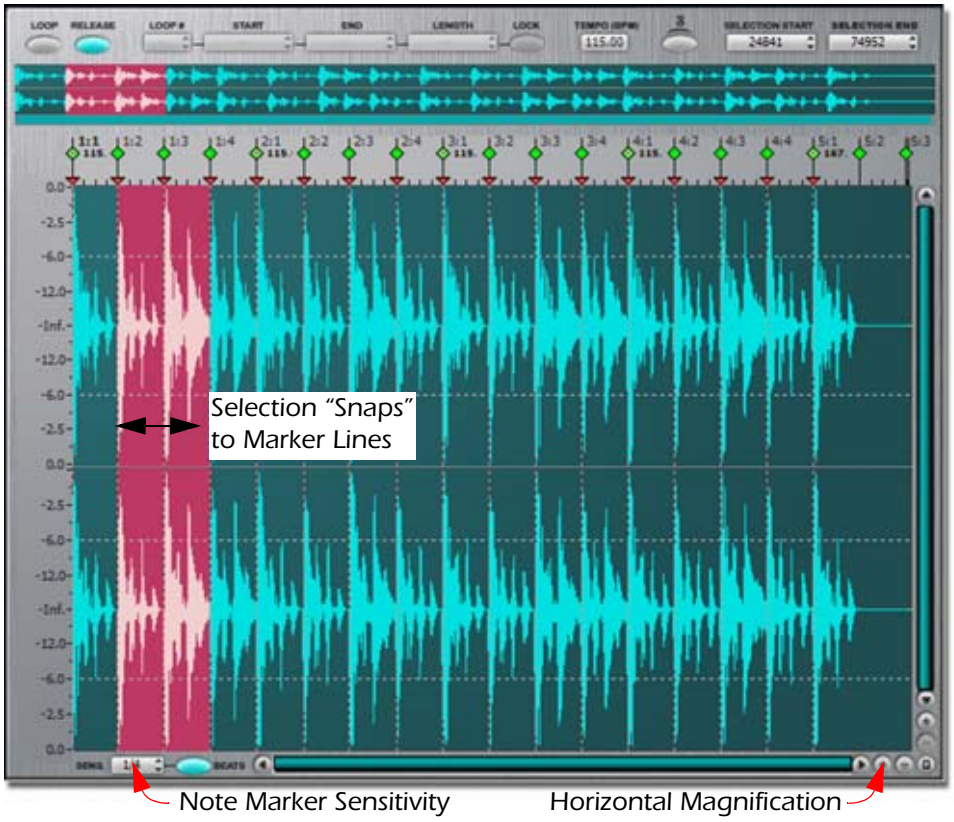


5. **Left-click anywhere in the waveform display** area.
6. From the Sample Edit menu, select **Beats**, then **Clear Beats**. The Beat Markers disappear. (If Clear Beats is greyed-out, click in the waveform display, then try again.)
7. Let's clear all the loops from the sample. From the Sample Loop menu, select **Delete All Loops**. OK, now we're ready to proceed.

▶ Analyzing the Beat



8. From the Sample Edit menu, select **Beats**, then **Beat Analysis** (Ctrl+B). The pop-up dialog box shown at the right appears.
9. Beat analysis works best when the Tempo Range is somewhat close to the actual tempo of the beat you want to analyze. In this case, try setting the tempo range 80 to 130 bpm. Leave the other parameters as shown and press **OK**.
10. The beat and note markers appear. The green diamonds ◆ are Beat Markers and the red triangles ▼ are Note Markers. Beat Analysis looks at your sample, and intelligently divides it into beats and notes. Each beat marker is assigned a bar and beat number. The first beat of the measure is denoted by a red dot in the beat marker.

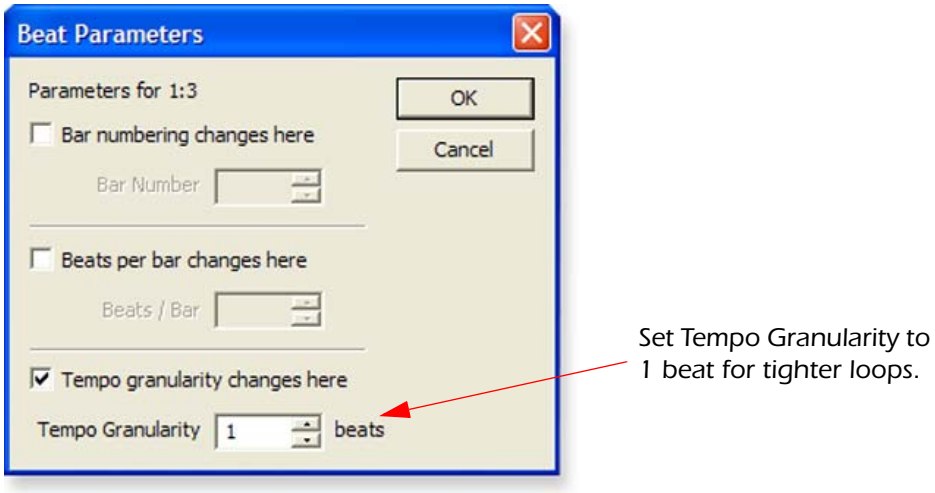


11. Select a section of the waveform and notice how your selection "snaps" to the marker lines. Zoom in on the waveform by clicking on the **Horizontal Magnification** button.
12. Play the selected section by hitting the **Space Bar**. Hit the space bar again to stop playing.

13. You can change the note division of the note markers by changing the **Note Marker Sensitivity**.
14. When the Beats button is on, note markers can be set to actual note values. When off, Note Markers are set according to amplitude percentage. It's easier to use actual note values, so leave the Beats button on.
15. Take a closer look at the Beat Markers again and notice that the first beat of each measure has a tempo label next to it. The tempo has been calculated once per measure. This is the **Tempo Granularity** and it is important because Twistaloop corrects tempo based on these markers.

Changing Tempo Granularity

16. To change the tempo granularity, **Right-click** on one of the green Beat Markers and choose **Beat Parameters** from the pop-up menu. The following dialog box appears.



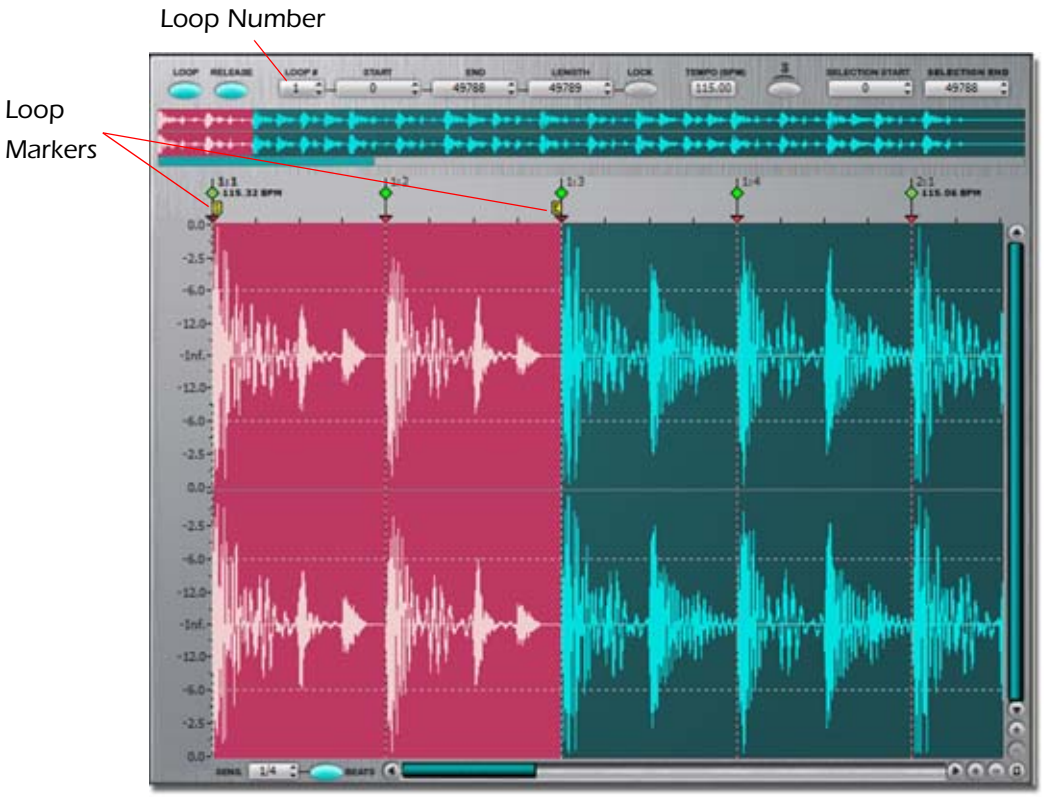
17. Check the box next to **Tempo Granularity Changes Here** and set the Tempo Granularity to 1 (update on every beat) for the tightest loops. Click **OK**.

    Tempo Granularity controls how often an original tempo is calculated. Lowering the Tempo Granularity can produce a tighter song, especially if you play multiple loops simultaneously. A higher Tempo Granularity, however, can produce a more realistic, less robotic sounding loop.
18. Notice that the tempo information now appears on each and every Beat Marker.

▶ *Creating Multiple Loops in the Sample*

After beat analysis, it's easy to select individual sections to create loops.

1. Select the first two beats by clicking and dragging over the section.



2. From the Sample Loop menu, select **Make Loop From Selection**. Yellow loop markers now appear at the beginning and end points of your selection.
3. Press the **Space Bar** to play the sample and select another section to loop. You can select loops while playing.
4. When you find another loop you like (and without stopping) make another one by clicking **Ctrl+Shift+L.** This is a quicker way to define loops.
5. Make a few more loops. Try changing the **Note Marker Sensitivity** if you want to snap to a smaller loop. Loops can even be inside of other loops.
6. Check out the **Loop Number** field above the waveform display. Changing the loop number highlights the loop markers of that loop.

Selecting Sections for Sample Editing

7. The beat and note markers are also extremely handy for selecting sections to digitally process. Set the **Note Sensitivity to 1/8 notes** and select a small section of the beat (highlight in red).
8. From the Sample Edit menu, select **Reverse**.
9. Press the **Play from Start** button |▶ and listen. Beat analysis makes it a snap to digitally process specific hits or sections.

10. From the Edit menu, select **Undo Reverse**. Now your beat is back to normal.
11. Now try out another digital process. Select **Adjust Gain** from the Sample Edit menu and set the gain to **-6dB**. Press **OK**.
12. Press the **Play from Start** button |▶ and listen again. You can see how easy it is to modify and reshape the beat.

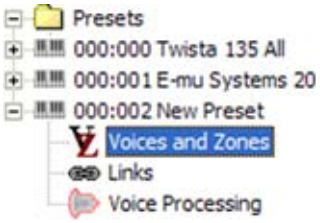
- **Note:** The Sample Edit processes are "destructive" because they modify the actual sample data when you save the bank. It's usually a good idea to **Duplicate** the sample before performing Sample Editing functions to preserve the original sample.
- **Note #2:** The FG 1 and FG 2 controllers in the Twista Mania bank allow you to *non-destructively* alter the beat using the Function Generators. To find out how it's done, examine the Function Generators and the associated Cords.

▶ *Controlling the Multiple Loops*

Earlier, you defined several loops. Now you'll learn how to select your loops using a MIDI controller.

Set up a New Preset

1. Let's start fresh with a new preset. Click the Preset folder in the Tree and select **New Preset** (Ctrl + W) from the Presets menu. A new preset appears in the Tree.



2. Click on **Voices and Zones**. The Voices and Zones page appears.
3. Select **S001 TL beat 1**, the first sample in the Tree, then **drag and drop it** over the **C3 key** on the keyboard at the bottom of the window.

4. A new voice named **S001 TL beat 1** appears in the window on note C3.
5. Select the **Key Win** tab. This window graphically displays the current sample to keyboard mapping. The display should look something like this. The red bars show the original keys.

6. Notice that the top voice has no sample. This empty voice was created when you created the Preset. We won't need this voice and can get rid of it. Select the empty voice by clicking on it. It becomes highlighted in red. Press the **Delete** key on your keyboard to delete it.
7. **Play C3** on your keyboard to verify that the drum beat plays.

Assign the Loop Controller

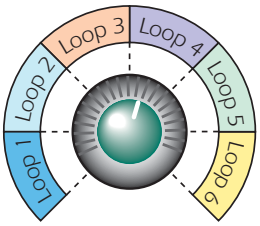
8. Select the Voice Processing page by clicking the Voice Processing icon in the Tree. Voice Processing The Voice Processing page appears.

9. Normally we would have to select the Voice using the **Voice Selector,** but in this case we only have one voice, so we can skip this step.
10. Set **Loop (n)** to 1. Select **Start At Loop**.

    The **Start At Loop** button determines whether playback begins from the beginning of the sample, or from the start point of the loop. You should keep the **Loop (n)** knob set to **1**. This allows you access to all your loops. Use the Cord's Source to control the initial loop.
11. Set up Cord 9 as shown with **MIDI A** as the source and **Loop Select (Jump)** as the destination.

12. Set the Cord Amount to **+100**.

13. When you play back the sample by playing C3, looping behaves as follows: If you don't touch the MIDI A controller on your keyboard, *playback begins at the start point of Loop 1*. Once you reach the end of Loop 1, Loop 1 repeats until you move the MIDI A, or release the note.
14. When you move the MIDI A controller, playback continues on the currently playing loop until it finishes, then it JUMPS to the loop selected by the MIDI A controller.

    The knob range is automatically divided according to how many loops you have set. If you had six loops defined, the loops would be selected according to the knob position shown at right.
15. MIDI A is just one way you can select loops. Any of the Cord sources can be assigned to control loops. You can also assign a range of keyboard keys to select loops (see the Emulator X2 pdf manual for details).

Labil yur Nobs!

16. We might as well label the Loop knob for future reference. Click on your new Preset in the Tree. 000:002 New Preset The Preset Globals page appears.
17. Type into the **Label field** for CTRL A. Now Controller A will be labelled in the main screen.

    Incidentally, you can also select which loop starts when the preset is selected by setting an Initial Controller Amount here. If you want Loop 1 selected first, leave the Initial Controller Amount Off.

▶ *Creating Region Loops*

Another way you can use a sample that contains bar, beat, and loop information, is with the Regions page in the Voices and Zones window. You can use the same sample for multiple voices, and select different beats or bars for each voice. This allows you to map different beats or bars from a single sample to different keys. The original sample is not altered.

As with loops defined in the Sample Edit window, you can lock your region-based forward loops to a clock source and modulate them using Tempo knobs.

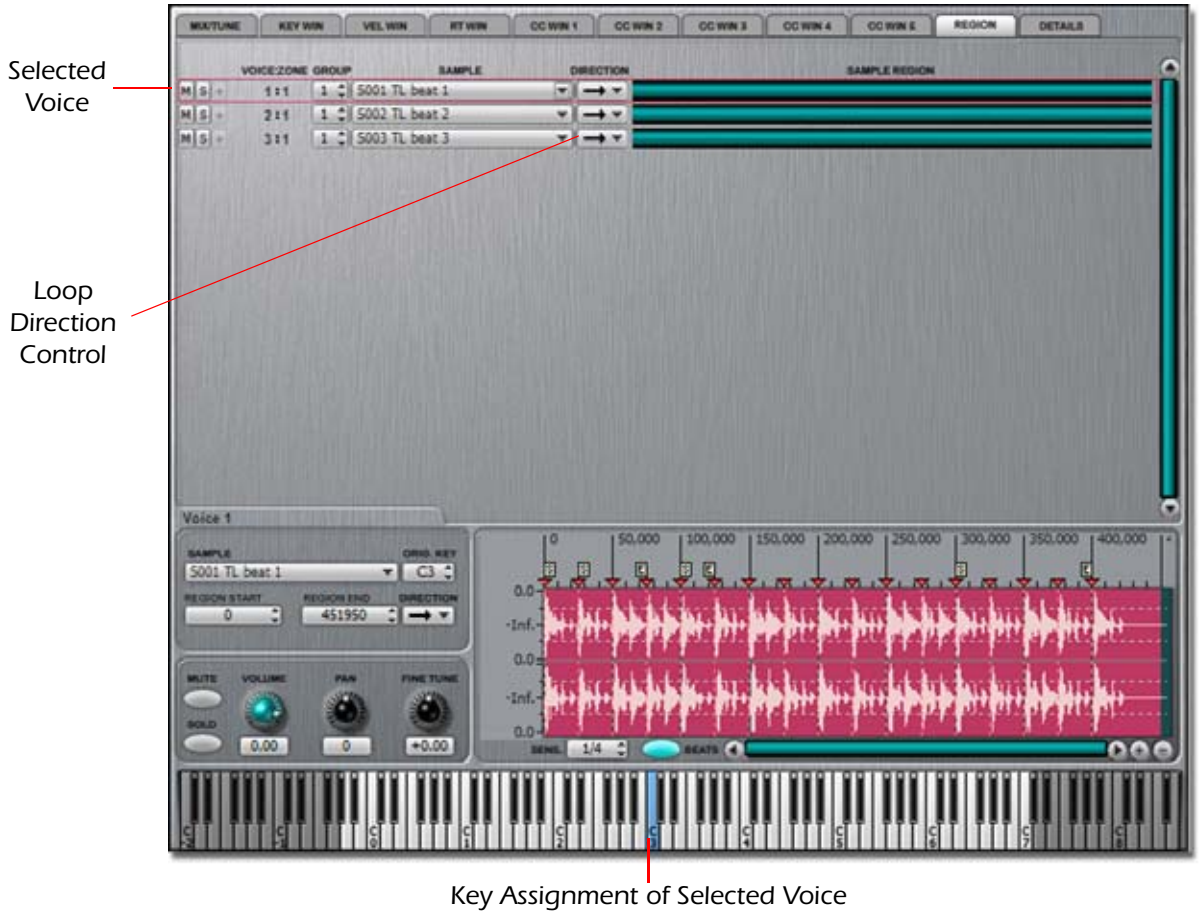
Create a New Preset

1. Make a new preset as you did before by clicking the **Presets** folder in the Sampler tree to the left, and selecting **New Preset** from the **Preset** menu.
2. In the new preset, select **Voices and Zones**. There should be one voice already there.
3. In the sampler Tree to the left, expand the **Samples** folder (but don't click any samples).

4. Click and hold sample **S001 TL beat 1**. While still holding down the mouse button, drag the sample to **C3** on the keyboard at the bottom of the Voices and Zones window. This creates a new voice, with the sample you selected mapped to C3.
5. Repeat step 5, this time dragging **S001 TL beat 1** to D3.
6. Repeat step 5 again, this time dragging **S001 TL beat 1** to E3.
7. Delete the empty voice that was initially in the preset by right-clicking the voice and hitting the **Delete** key on your computer keyboard.

Setting a Voice Region

8. Select the voice assigned to C3 by clicking on it. The voice becomes highlighted in red and the keyboard at the bottom of the shows C3 in blue.
9. Click the **Region** tab. The Region Editor display appears at the bottom of the page.



10. Take a closer look at the waveform display and note that it has the same beat markers, note markers and beat sensitivity controls. Dragging your cursor over the waveform display will cause the select to snap to beat and note markers.

11. Choose 1/8 Note Sensitivity and click the ⊕ Horizontal Magnification button twice.
12. Select **Forward Loop** using the Loop Direction Control and play the **C key**.
13. Make a selection for your loop by clicking in the display. Adjust the loop until you find one you like.

Set Another Voice Region

14. Select the voice assigned to D3 by clicking on it. The voice becomes highlighted in red and the keyboard at the bottom of the shows D3 in blue.
15. Select **Forward Loop** and play the **D3 key**.
16. Select another loop by clicking in the display. Now you have two loops you can play with C and D.
17. Select the voice assigned to E3.
18. Select **Backward Loop** and play the **D3 key**.
19. Set another loop. Now you have loops on C, D and E.

Turn TwistaLoop On

20. The three loops you created may sound good together, but they aren't really synchronized. For that, you have to turn TwistaLoop On.
21. Click the **Emulator X icon** above the Tree. The main Multisetup page appears.
22. Turn **TwistaLoop Override On** at the bottom of the page. Now your loops will lock together and lock to the master tempo.

23. **Try changing the Tempo** and note that your loops lock to the new tempo. *(Tempo is located above and to the right of the TwistaLoop Override.)* If the tempo knob is "greyed-out" uncheck "External Tempo Source" in the MIDI Preferences menu. (Options, Preferences, MIDI tab).

- Keep in mind that all the other Tabs in the Voices and Zones window are still active and can be used to select voices. In fact ALL the Emulator X features (such as the filters and synth parameters) are active and can be combined with Twista Loop any way you can imagine.

▶ *Region Xplode*

You've just created three voice regions. Now we're going to show you how to create new voice regions automatically using the Region Xplode feature.

1. Select one of the forward looped voices, then select another section of the wave from the Region Editor. Region Xplode creates new voices based on the setting of the Sensitivity control. In the example below a new voice will be created for every eighth note in the selection.

2. Set the Sensitivity control for the note division you want.
3. From the Preset menu, select **Region Xplode**. A pop-up dialog box appears.

4. **Set the Start key to C4** and leave the Placement field set to "White Keys." **Turn Export MIDI File Off** if it's on. **Press OK.**
5. A bunch of new voices suddenly appear. That was pretty easy. You can play through the sample by playing up the keyboard.

- **Important Point:** In order for TwistaLoops to synchronize, the loops must be located between **Beat Markers** (not note markers). TwistaLoop must also be turned on. You can verify this for yourself by simultaneously hitting two keys.

6. Now try moving the **Pitch Wheel** of your keyboard while you play a loop. Notice how the pitch changes, but the beat stays constant. *(If it doesn't, TwistaLoop is off.)*
7. You can also change the pitch of the sample by changing the **Original Key** in the Voices and Zones page. As before, the beat timing stays constant.

Hopefully you now have a pretty good idea of what TwistaLoop is all about. If you need more information, there's a whole chapter devoted to TwistaLoop in the Emulator X Operation Manual.

24 *Cycle Groups*

The advent of sampling and sampled drum machines allowed non-drummers to create their own drum tracks. But even though early drum machines used actual digital recordings as their sound source, you could still tell that it was a machine and not a real drummer playing.

Part of this is probably due to overuse of the Auto Correction feature, and that a real drummer plays, well, like a real drummer. But a big part of the problem stems from the fact that the human ear is extremely sensitive and can discern that the same sample is being played over and over. Your brain gets bored easily.

The Cycle Group feature on the Emulator X is designed to correct this short-coming. Instead of playing one sample over and over, the cycle group feature allows 2, 3 or 4 samples to be cycled, or if you so desire, played randomly. As it turns out, this little juggling act is enough to fool the ear.

Other slight variations in the sound can also work wonders. Drum programmers commonly route: velocity-to-volume, velocity-to-filter, or velocity-to-sample start to make each note unique.

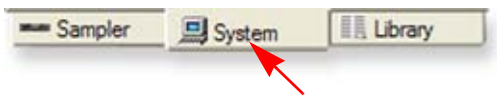
The use of Cycle Groups is not limited to drums and percussion. Cycle Groups work great with bowed strings, so that you can alternate between up and down bowing. Most instruments will benefit from the variation that Cycle Groups provide. However it's much more difficult to match the tonal properties of pitched instruments to create a realistic sounding instrument model.

In this example, we'll use just two snare drum samples to illustrate the point. If you want the ultimate drum set, you'll want to sample two to four similar-sounding hits at several strike velocities. Some keys in our **Protean Drums** bank have eight or more samples mapped to create a super-realistic acoustic kit.

▶ How to Use Cycle Groups

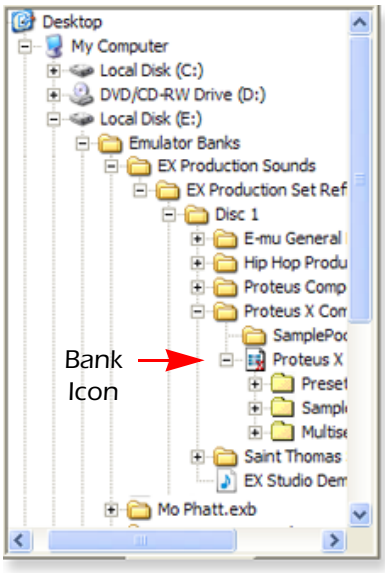
Locate Samples and Load them into the Bank

1. Make sure you have either the Proteus Composer or Proteus X Composer bank on your hard disk.
2. Let's start with a clean slate. Select **New** from the **File** menu.
3. Click the **System** Tab at the bottom of the Tree.

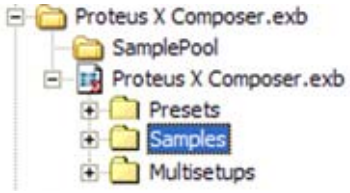


4. Locate the **Proteus X Composer bank** on your hard disk. The default location for sound banks is: "Program Files\Creative Professional\ Emulator X\Production Sound Banks".

5. Drill down into the Tree until you find the Proteus X Composer Bank. Open the **Bank Icon.**



6. **Click on the Sample Folder**, highlighting it as shown below.

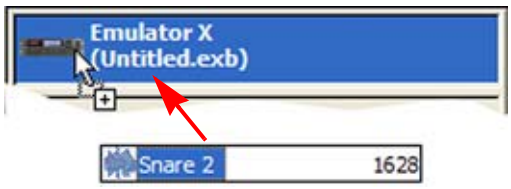


   The entire list of Proteus X Composer samples appears in the large pane to the right of the Tree.

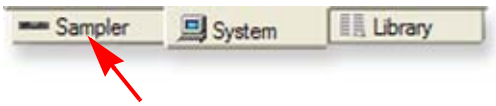
7. For this lesson, we're interested in two particular samples: **1628-Snare 2**, and **1630-Snare Tail**.

8. The samples may be listed in alphabetical order. To sort by ID number, **click on the ID heading** above the list.

9. **Drag and Drop the Snare 2** and **Snare Tail** samples over the **Emulator X icon** above the Tree. The samples have now been added to the empty bank.



10. **Click the Sampler Tab** at the bottom of the Tree. Now you're back in Emulator X territory.



Build a Preset

11. **Click on the Presets folder** Presets in the Tree to give it the focus.

12. From the **Presets menu**, select **New Preset** (Ctrl+W). Note that this option was not available until you selected the Presets folder. A new preset appears.

13. **Click the Voices and Zones icon** Voices and Zones in the Tree. The Voices and Zones page appears in the right pane.

14. **Open the Samples folder** by clicking on the plus symbol ⊞ next to the folder. The two samples you added to the bank should be there.

15. **Drag and Drop the first sample** right over the top of the empty name field of the voice that was created with the preset.

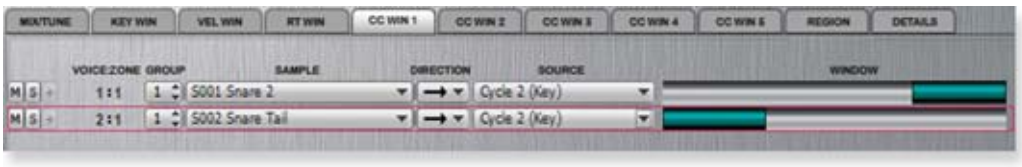
Don't let go of the mouse button *before* dropping the sample or the Sample Edit screen will appear. *(If it does, simply click on the Voices and Zones icon to try again.)*

16. **Drag and Drop the second sample** anywhere **BELOW** the name field of voice one. This creates a new voice. If you drop a sample on the name field, it replaces the sample in that voice.

Assigning the Voices to Cycle Groups

17. **Click the CC WIN 1 tab** above the Voices and Zone page.

18. Select **Cycle 2 (Key)** from the Source menu for both voices as shown above.
19. Next, grab the Window Range Bars and adjust as shown below so that the range of one voice encompasses the value of 127 and the other voice encompasses the value of 0.



- **An Explanation:** Cycle 2 (Key) generates an alternating value of 0, then 127, then 0 and so on, every time the same key is pressed. If a Voice's Window Range contains the value generated by the Cycle 2 generator (0 or 127). then that voice will sound. None of the other values matter.

20. **Repeatedly play the same key on the keyboard.** You should hear the two snare drums alternating with each key press.

    These two drums were chosen for this example because they are fairly close in timbre, but they're probably not even from the same drum set! When you sample your own drums, the effect is much more believable. Check out the Protean Drums bank if you want proof.

Cycle 2 (Channel)

21. Change the **Source** of both voices to **Cycle 2 (Channel)** and play the keyboard. Do you notice the difference? The drums now alternate with ANY key press. Before they only alternated if you played the same key.

Randomize the Drums

22. Now **change the Window Range** bars so that each voice covers half of the range, as shown below. One voice's range extends from 0-63 and the other from 64-127. It doesn't matter which is which.

23. **Change the Source** of both voices to **Random**.

- **An Explanation:** A new random number between 0 and 127 will be generated whenever you press a key. If a voice contains that number in its range it will play, if it doesn't contain the random number, then it won't play.

24. **Play the keyboard.** The two snares alternate randomly.

25. If you change the ratio of the Window Range bars as shown at right, Voice 2 has more chance of being selected.

- Of course you can combine the Cycle Groups with other conditions such as velocity. As an example, you could have one particular sample that always plays when the key velocity is greater than 90. Otherwise the three other (lower velocity) voices cycle. How? In the VELWIN, simply set the three cycling voices to sound with velocities of 0-89 and the other voice to sound with velocities of 90 and above.

- There's no rule that says that the cycling voices have to be the same sound. You could create an entire keyboard full of crazy random keys if you wanted. Hmm? That experimental music show is coming up....

- Try routing one of the MIDI A-P controllers to your CC Window. Now the voices will be selected by the setting of a knob. *(Wherever the knob is set at note-on time.)*

Special Effects

Special effects are the spices of your music, and also happen to be a special forte of Emulator X and Proteus X. We begin this chapter with the obligatory random computer effect, then veer off through a panoply of wonderful and fantastic effects.

We all know that a little bit of flanging or echo can make a sound a lot more interesting. Well, how about effects that are controlled by the key velocity of pressure? The voice-controlled effects of the Emulator X and Proteus X provide a new level of musical control that has yet to be fully explored.

Special effect sounds can also be powerful idea generators when composing, or when you get stuck in a creative rut. Most of all they're fun and can add that extra bit of polish to your song.

25 *Random Sample/Hold Effect & the Quantizer*

One of the classic synthesizer effects involves controlling either the pitch or the filter cutoff with a random stepped source. Traditionally this was done with *Noise Generator* routed through a *Sample and Hold* module and then to pitch or filter cutoff.

The Emulator X/Proteus X can easily create this effect using the **Random** LFO waveshape.

▶ Create a Random S/H Effect:

1. For this example, let's start with a synthesizer preset from the Proteus Composer bank - **P0343 Synth 10**.
2. **Type 343** to the Preset number field in the Single view and press **Enter**.

3. To jump right into the Voice Processing Page, **press the Voice Processing button in the Toolbar**. It looks like this: *(This shortcut also jumps you to the preset in the Tree.)*
4. Select **All** in the **Group** field (lower left corner) to select all voices for processing.
5. Select the LFO/LAGS tab. The LFO sub-page appears.

6. Change the **Shape** of LFO 1 to **Random**.
7. Set the **Frequency** (FREQ) to about **7.00**.

8. Over in the Cords section, change the Amount of Cord 1 to **+100.**

9. Now just turn up your Mod Wheel and play. The classic S/H sound.

▶ Route the S/H to Filter Cutoff:

1. Change the destination of Cord 2 to **Filter Frequency**.
2. Adjust the initial filter frequency. **MIDI controller A** and the **Filter Frequency control** in the Voice Processing page both affect the initial frequency.
3. **Adjust the filter Q** (resonance) to obtain the classic synthesizer effect.

Reducing Filter Popping

4. The sharp transitions of the LFO may cause the filter to pop, especially with high amounts of resonance.
5. Inserting a Lag Processor after the Quantizer will smooth the sharp transitions and reduce the popping. The complete patch is shown in the chart below. The new Lag connections are shown in **Bold**.

Cord #	Source	Amount	Destination
01	Mod Wheel	+100	Cord 02 Amt
02	LFO 1 +	0.00	**Lag 1 In**
21	Lag 1	**+100**	**Filter Frequency**

6. **Adjust the rate of Lag 1 to about 0.5 or 1.** This should reduce the filter popping to an acceptable level. Large rate values will completely smooth the transitions, but will negate the stepping effect that we want.
7. **Adjust the filter Frequency and Q** settings until you have a sound you like.
8. Try out some of the different filter types.

- **Note:** Some of the filter types may distort because of their extremely high Q values. If you hear distortion, simply reduce the **Amplifier Gain** *(located immediately to the right of the Filter Frequency)*.

▶ Create Sample & Hold Effects with the Quantizer

The quantizer can be used to create complex stepped patterns using LFO waves or other modulation sources such as envelope generators. By combining both LFOs, then quantizing the sum, interesting S/H style patterns can be easily created.

1. First of all change the **Shape** of LFO 1 to a Sawtooth. Set the FREQ of LFO 1 to about 1.50 Hz.
2. Next, change the Cord 1 **Amount** to **+50**.
3. Set Cord 2 with **LFO 1+** as the source and the **Quantizer** as the destination.

4. Select the **19-27 tab** on the Cords and set up Cords 19 and 20 as follows:
5. Cord 19: **LFO 2 +** to **Quantizer** with an Amount of **+50**.
   Cord 20: **Quantizer** to **Pitch** with an Amount of **+100**.

   A summary of all the Cords is shown below:

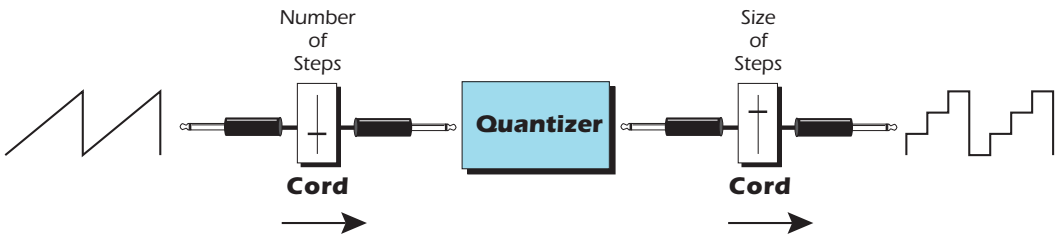
Cord #	Source	Amount	Destination
01	Mod Wheel	**+50**	Cord 02 Amt
02	**LFO 1 +**	0.00	**Quantizer**
19	**LFO 2 +**	**+50.00**	**Quantizer**
20	**Quantizer**	**+100.00**	**Pitch**

6. Almost finished. Change the **Shape** of LFO 2 to **Sawtooth** and set the FREQ about **0.30** Hz. Turn **Key Sync Off.**
7. All set. Now play the keyboard and adjust the Mod Wheel to hear the double ascending pattern.
8. Now just play with the various settings of the LFO waveforms, LFO frequencies, and Cord amounts for endless pattern variations.
9. Speaking of variations, the **LFO Variation** control will slightly randomize the LFO frequency each time you press a key.

▶ Background: Quantizer

The quantizer is a modulation processor that turns smoothly changing values into discrete steps. But what is it good for?

- Connecting the quantizer between the Mod Wheel and Pitch will give you a pitch bender that shifts the pitch by specific amounts.
- The quantizer transforms LFOs and envelopes into stepped shapes which can be set to semitone values.
- Aftertouch can be routed through the quantizer in order to obtain specific pitches.
- The diagram below shows the quantizer converting a sawtooth waveform into a staircase.



The amount of the **Input Cord** determines the **Number of Steps**.
The amount of the **Output Cord** determines the **Size of the Steps.**

Pitch Amount Chart

In order to obtain specific pitches when routing LFOs, envelopes and controllers through the Cords use the following chart.

Semitone	Cord Amt	Semitone	Cord Amt	Semitone	Cord Amt	Semitone	Cord Amt
1	3.125	**7**	21.875	**13**	40.625	**19**	59.375
2	6.25	**8**	25.00	**14**	43.75	**10**	62.50
3	9.375	**9**	28.125	**15**	46.875	**21**	65.625
4	12.5	**10**	31.25	**16**	50.00	**22**	68.75
5	15.625	**11**	34.375	**17**	53.125	**23**	71.875
6	18.75	**12**	37.5	**18**	56.25	**24**	75.00

Change the Modulation Source

10. Try using the **Aux Env +** instead of the LFO+. You'll have to adjust the Aux Env shape, but now you have complete control of the stair steps.

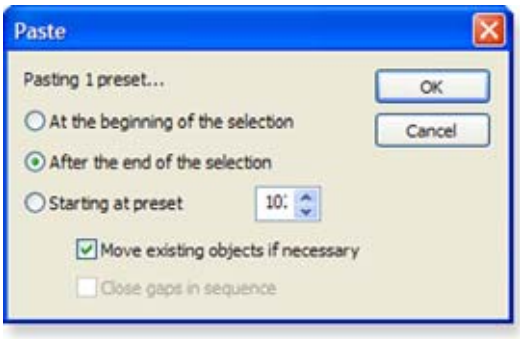
26 *Repeating Octave*

The Repeating Octave tuning table can be used to create automatic chord inversions that change the tone and flavor of your music.

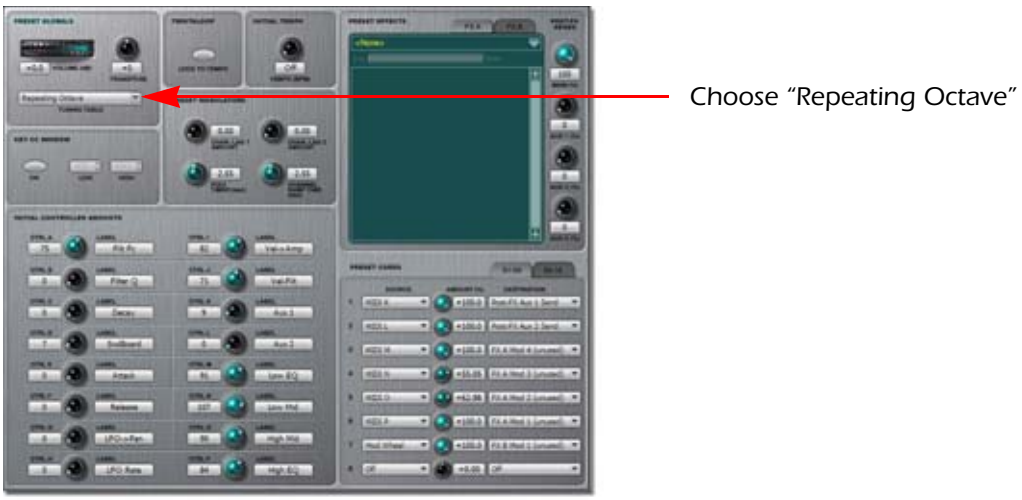
The easiest way to try this out is to modify a factory preset. In preparation for this tutorial, load up the Proteus Composer bank.

▶ *Doubling a Preset with a Repeating Octave:*

1. Select **P0000 DynamicGrand** from the Tree by clicking on the little keyboard.
2. Select **Edit, Copy** from the Menu Bar.
3. Select **Edit, Paste** from the Menu Bar. A popup dialog box appears.



4. Select "Pasting preset **after the end of the selection"**. This takes a few seconds while 1000 presets are reordered. When the operation is complete, there will be a copy of the preset "DynamicGrand" in the P0001 slot.
5. **Rename** the new DynamicGrand in the P0001 slot to **DynamicGrand2**.
6. **Click on the keyboard icon** in the Tree of the new preset. The Preset Globules page appears.
7. Select the **Repeating Octave** tuning table.



8. Select **P0000 Dynamic Grand** from the Tree. Open the preset by clicking on the little (+) sign next to the little keyboard.
9. Select **Links**.
10. Select **New Link** from Links on the Menu Bar. A new empty link appears.
11. Select **DynamicGrand2** for the linked preset.
12. Play the keyboard. You'll hear both presets playing with strange inversions.

Other Tonal Variations

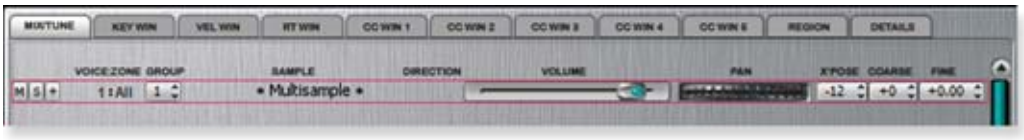
13. Go to the **Preset Globules** menu of DynamicGrand2 and change the Transpose to **-12**. Note the tonal variation as you play up and down the keyboard.
14. Change the Transpose to **+12.**
15. This example is very easy to program, yet offers a lot of interesting possibilities. Try using different presets or other transpose intervals.

27 *Voice Delay*

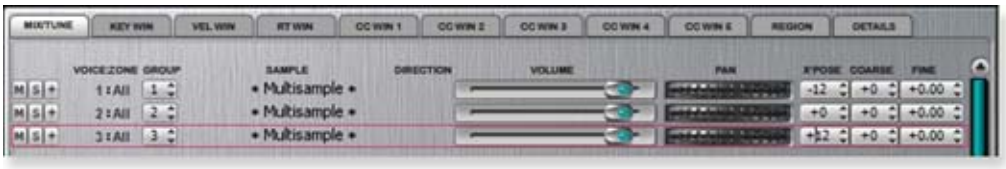
This simple trick can turn a ordinary preset into something really special. Basically, you create several copies of a voice, change the tuning and delay the copies. Voice Delay is useful to create evolving or beat synchronized presets.

▶ *Create a Voice Delay Preset:*

1. Let's start by loading the **Proteus X Composer** bank.
2. Select **P0037 JunoPlseComp** from the Tree.
3. **Open the preset** by clicking on the (+) symbol next to the icon.
4. Select the **Voices and Zones** page. Voices and Zones The preset contains one multisampled voice.



5. Duplicate the voice two times by selecting **Duplicate Voices** from the Preset menu twice.



6. **Change the Group** number of the new voices to be 2 and 3 as shown above. This will make it easier to select them later on.
7. Set the transposition (X'POSE) of voice two to **(+0)**, as shown above.
8. Set the transposition of voice three to **(+12)**, as shown above.
9. Select the **Voice Processing** page by clicking on the icon in the Tree.
10. **Select Group 2** for processing. Because each of the three voices belongs to a different group, it's easy to select them here.

11. Set the **Voice Delay to 250 ms**.
12. **Select Group 3** for processing and set the **Voice Delay to 500 ms**.
13. Play arpeggios to hear the echo effect.

Other Ideas: Try different Transpose settings. You can change the character of the new voices by editing the voices (filters, envelopes, etc.). By setting the Delay to **BPM**, the echoes synchronize to the Master Tempo. Copy a voice from another preset and delay it.

28 *Chromatic Glide (Glissando)*

Glissando is similar to glide, except that the pitch changes in chromatic steps instead of a smooth slide between notes.

This patch is not exactly obvious, but it makes sense once you know the secret. It's another example of how the "Power of the Patchcords" can be used to create new features for your Proteus or Emulator X.

▶ To Add Glissando:

1. To try out this example, load the **Proteus X Composer** bank and select **Preset 26: LV's Worm** from the Tree by clicking on the little keyboard. This is a nice monophonic lead that makes a good starting point for this effect.
2. Next click on the **(+)** symbol to open the preset modules.

3. Click on the **Voice Processing icon** . The Voice Processing (synthesizer controls) module appears.
4. Select page three of the Cords section, which has a bunch of unused Cords.
5. Set-up the Patchcords as shown at right.
6. Key Glide is **amplified** four times, then **inverted** and routed to **Pitch**. This cancels out the normal Glide patch.
7. The 4x Key Glide signal is next sent to the Quantizer **twice** at full level (100% just wasn't enough).

   The output of the **Quantizer** is then routed to **Pitch** with an amount of **+50**. (The output of the Quantizer determines the step size.)

6. These Cords Cancel the normal Glide

7. These Cords Add the Quantized Glide back in

8. That about does it. Now just increase the Glide time and play.
9. After you've explored glissando awhile, try, changing the **Key Mode** to **Poly Normal**. What's better than glissando? Polyphonic Glissando!

29 *Reversed Keyboard*

This patch reverses the direction of the keyboard so that playing left to right will go from high to low pitches.

Why would you want to do this? Well, try it and find out. You will be forced out of your old playing patterns and that can be a very good thing. And, it's fun!

Incidentally, Joe Zawinul of Weather Report fame was an ardent proponent of this technique and used it extensively.

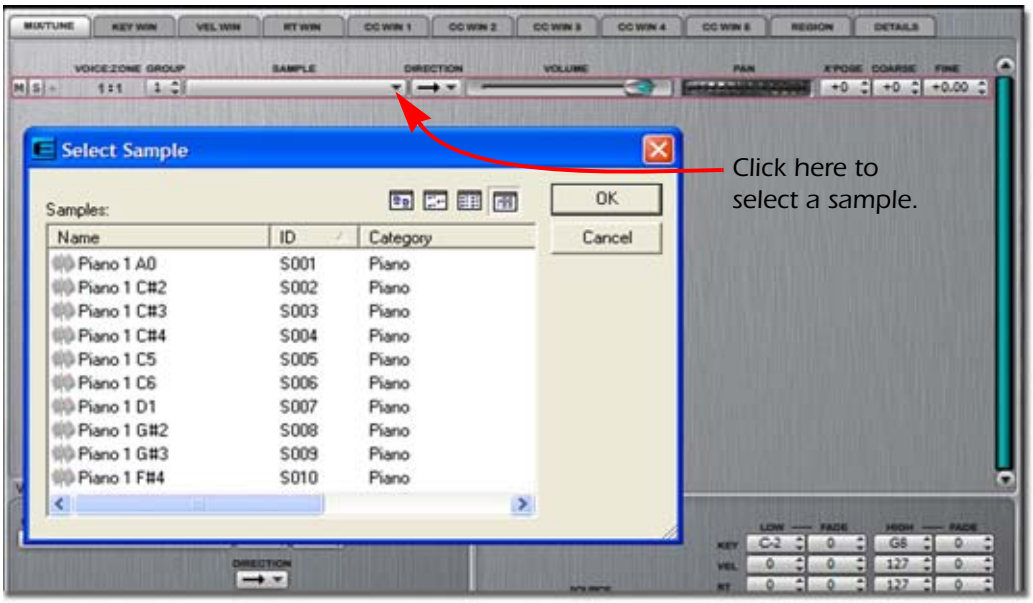
- **One Caveat:** We're creating this patch the easy way using a single voice. It can be done using multiple voices, but it's much harder.

▶ *To Reverse the Keyboard:*

1. Begin by loading the **Proteus X Composer** bank.

Create a New Preset

2. Select the **Presets Folder** from the Tree
3. Select **New Preset** (Ctrl+W) from the Preset menu. You can also create a new preset by Right-clicking over the Preset folder in the Tree.
4. Your new preset appears at the very bottom of the preset list in the Tree. Click on the **plus symbol** ⊞ to open the preset.
5. Select **Voices and Zones**. Voices and Zones The Voices and Zones page appears.
6. Click on the little triangle icon ▼ in the Sample selection field. The Select Sample dialog box appears.



7. Select **Piano 1 C#3** and click **OK**.

8. Select **Voice Processing** on your new preset in the Tree. The Voice Processing page appears.
9. Select **All** as the Group at the bottom of the page. Strictly speaking, you don't have to do this since we only have one voice, but you need to get in the habit of selecting the proper voice.
10. Turn **Fixed Pitch** On in the Oscillator section. This disconnects the keyboard control of pitch.

11. Click the 10-16 tab in the Cords section and set up Cords 10 and 11 as shown in the screen at right.
12. The Cords reconnect the keyboard to Pitch, but in a negative direction (-100 -> Pitch). One Cord at 100% doesn't give us enough pitch control so we're using the 4X Amplifier to multiply it. This is exactly the amount of modulation necessary.
13. The keyboard pitch is now inverted (try it), but the pitch is one semitone off at C3. Set the **Coarse Tuning to -1** to bring Middle C back up to concert pitch.

14. That's the reverse keyboard patch. Now forget everything you've learned about the keyboard and make some truly original music.

30 *The Ever-Popular Dropping Ball Effect*

Everyone has heard the sound of a ball bouncing faster as it comes to rest. It's an interesting sound and very easy to create. Although the patch works best with percussive sounds, other kinds of samples can also be used to create other unique effects.

▶ To Create a Dropping Ball Effect:

This patch retriggers the sample using one of the LFOs. The Aux Envelope is used to modulate the LFO speed to make it gradually speed up. Simple!

1. For this experiment, let's begin with **P0926-Marimba** from the Proteus Composer bank. Select the preset from the Tree and open it by clicking on the (+) symbol next to the little keyboard icon.
2. Set the Cords as shown in the screen below. The modified Cords are highlighted in Red.

CORDS
01-09
10-18
19-27
28-36
SOURCE
AMOUNT (%)
DESTINATION
1 Mod Wheel +12.00 Cord 02 Amt
2 LFO 1 ~ +0.00 Sample Retrig
3 Footswitch 1 +100.0 Key Sustain
4 MIDI A +100.0 Filter Frequenc
5 MIDI B +80.00 Filter Resonan
6 MIDI C +35.00 Amp Env Deca
7 Filter Env ~ +0.00 Filter Frequenc
8 MIDI D +24.00 Sample Start
9 MIDI E -17.00 Amp Env Attac

CORDS
01-09
10-18
19-27
28-36
SOURCE
AMOUNT (%)
DESTINATION
10 MIDI F -50.00 Amp Env Relea
11 MIDI G +100.0 Cord 12 Amt
12 Aux Env + +34.00 LFO 1 Frequen
13 MIDI H +12.00 LFO 2 Frequen
14 MIDI I +80.00 Cord 15 Amt
15 Velocity < +0.00 Amp Volume
16 MIDI J +100.0 Cord 17 Amt
17 Velocity ~ +0.00 Filter Frequenc
18 Key + +0.00 Filter Frequenc

3. Set up LFO1 and the Aux Env. as shown in the screen below. Getting the ball to drop smoothly is a little tricky. You can adjust the Aux Envelope to you own taste if you like.

4. Turn up the Mod Wheel up a little to engage the dropping ball effect (when you play a key).
5. The charts below show all the necessary changes from the P0926-Marimba patch.

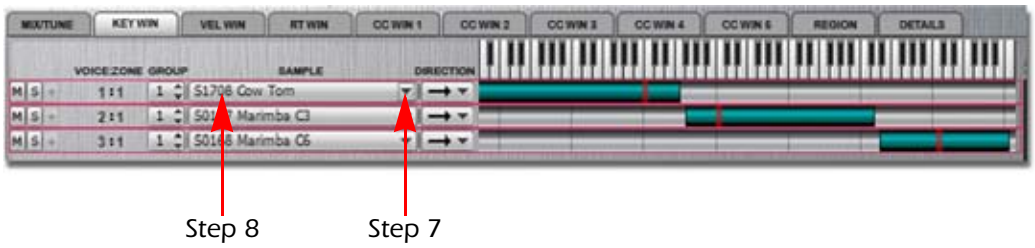
Cord #	Source	Amount	Destination
02	LFO 1 ~	0.00	Sample Retrigger
12	Aux Env +	34.61	LFO 1 Frequency

Aux. Env.	Atk 1	Atk 2	Dcy 1	Dcy 2	Rel 1	Rel 2
Time	0.000	0.000	1.462	17.118	0.192	0.000
Level	0.0	-3.8	15.0	93.8	0.0	0.0

LFO 1 Frequency	1.74

Try another Sample (Emulator X only)

6. Click Voices And Zones in the Tree. The following screen appears:



7. Change Voice Zone 1 to sample **S1708 - Cow Tom** by clicking on the triangle button and selecting sample 1708. This sample isn't looped so it won't retrigger. We can fix that easily enough.
8. **Double-click on the name Cow Tom** in Voice Zone 1. The Sample Edit window opens.
9. Click the Loop button to turn the loop on. *(This sample was looped but the loop was turned off.)* Now the sample retriggers properly.

31 *The Backwards Talking Game*

This trick comes to you all the way back from the Emulator 1 days when sampling was something magic. Well, sampling is still magical and some tricks never get old. This one never fails to amaze.

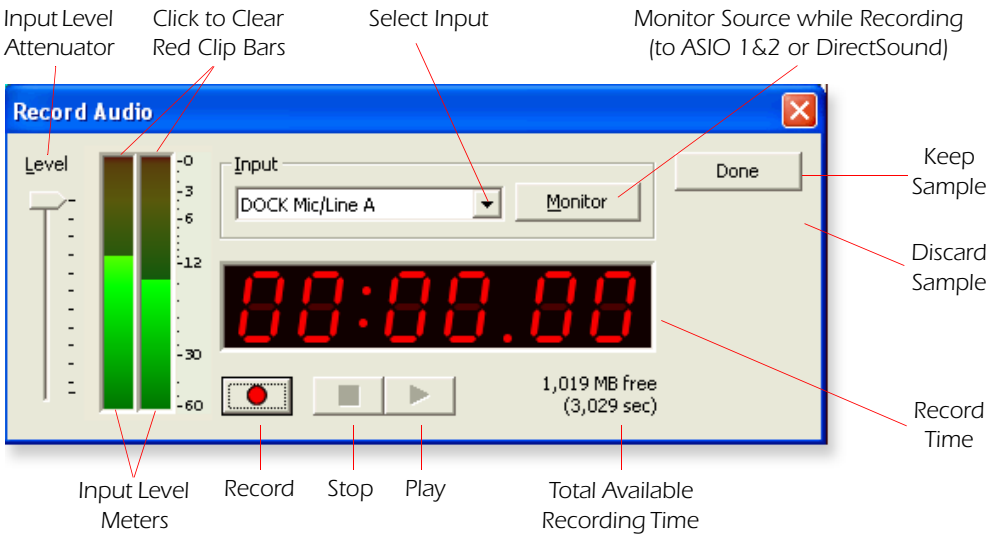
It's simple. Basically, you sample your voice speaking a short phrase and reverse the sample. Next, you learn how to pronounce the reversed phrase and sample your voice speaking the reversed phrase. And then (of course), you reverse it again!

This effect plays havoc with speech inflections and sounds like nothing else.

▶ Play the Backwards Talking Game:

Record a Phrase

1. Choose **Acquire** from the File menu. The Acquire/Chop Samples screen appears.
2. Press the **Record...** button. The following dialog box appears.

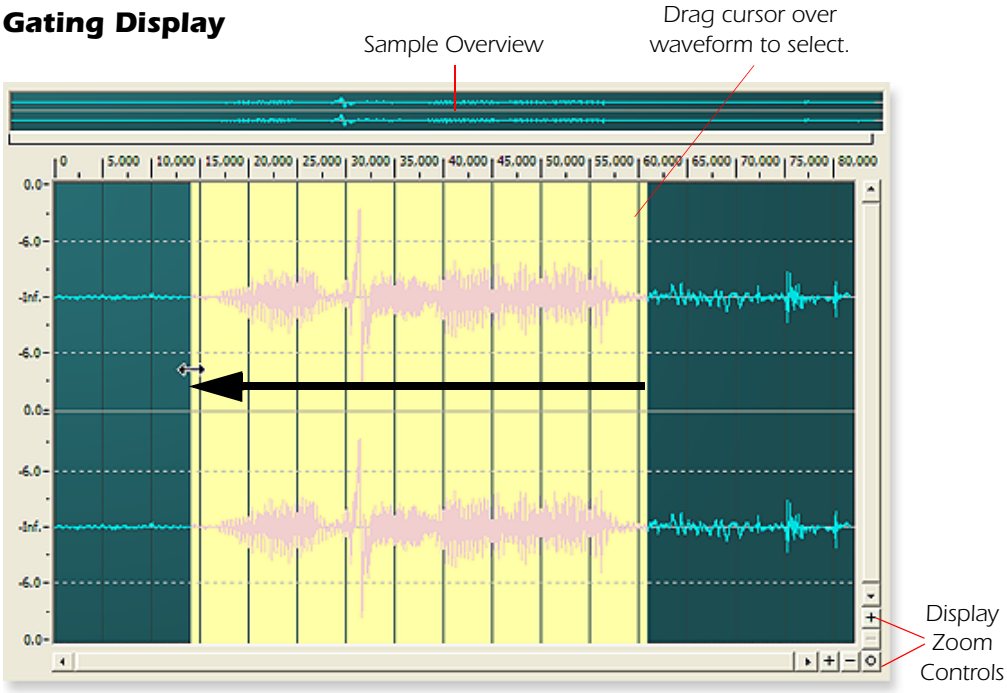


3. **Select your Microphone Input**. The displayed input selections are based on which ASIO channels are open when the Record Audio dialog was first opened.
4. **Set your input level.** While speaking into the microphone, watch your meters. Adjust the input level of your audio interface or preamp. The signal peaks should illuminate the yellow area of the meter. The red bar at the very top of the meter indicates clipping and will stay on after clipping is detected. Left-click on either red bar to clear the clip indicator.
5. **Press the Record** button to begin recording and begin speaking. The Record Time display begins running and the Total Available Recording Time will begin to slowly decrease.
6. **Press the Stop** button (or hit the spacebar) when you're finished recording.

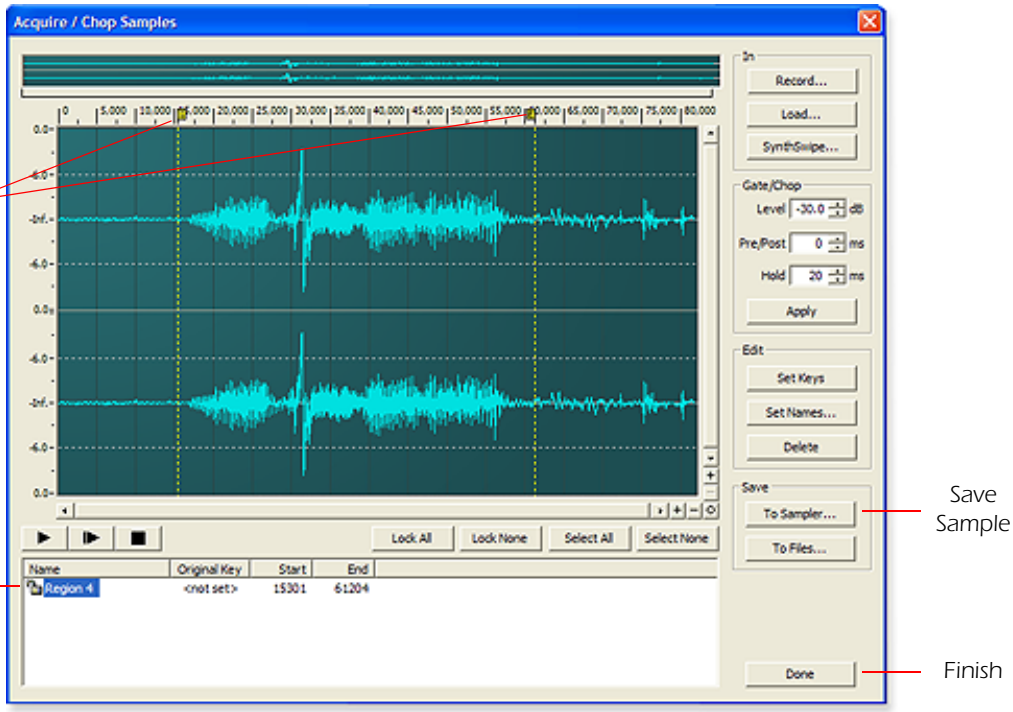
7. Press **OK** to keep the sample or **Cancel** to discard the sample. (Pressing Record again without clicking OK also discards the previous sample.)
8. After pressing **OK**, you're ready to set up the automatic sampling features.
9. Play the sample by pressing the ▶| button. When you've found the part you want to keep, drag the cursor over that part of the waveform. When you release the mouse button, *Gates* will mark the selected region.

Gating Display

1. Drag to Select



2. Gates Appear



10. You can adjust the Gates by dragging them. When you have the desired region selected press **Save To Sampler**.
11. A pop-up dialog box appears. Press **OK** to continue.
12. Press the **Done** button to exit the Acquire module.

Reverse the Sample

13. Your sample now appears in the Sample Edit module. (It's a stereo sample since Emulator X only samples in stereo.)
14. **Select the entire sample** by double-clicking on the waveform with the mouse.
15. Select **Reverse** from the Sample Edit pull-down menu or by clicking the Reverse tool from the toolbar.

Practice Speaking the Reversed Sample

16. Press the **Play** button ▶ to hear your reversed phrase.
17. Keep playing it over and over while you learn to pronounce the backwards speech.

Sample Backward

18. Think you've got it? Go back to the **Acquire Samples...** menu again and go through the Sampling and Reverse procedure again.
19. We guarantee weird results and maybe even a few insights.

32 *Machine Gun Drums*

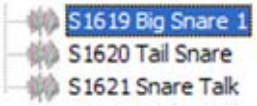
Some people don't consider sampling instruments to be a true synthesizers because the sound source is a recording rather than a generated waveform. This may be partially true, but when a sampler has the ability to modify the sampled waveform in real-time, as the Emulator X2 does, it definitely qualifies as a *real* synthesizer. Sampling is still around because it offers what no other synthesis method can, the ability to play ANY sound as a musical instrument.

In this programming trick we'll use several types of waveform modification to twist a snare drum sample into an effect more suggestive of granular synthesis than of a drum. By creating several loops and then switching through them in real-time, the waveform dynamically changes.

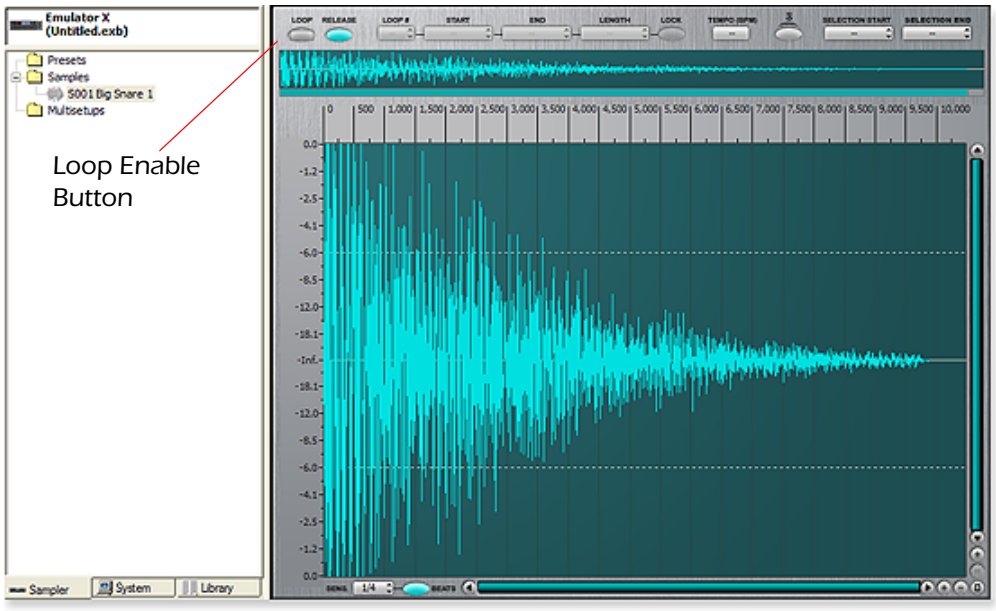
▶ To Make a Machine Gun Drum:

Pick a Drum

1. Find a drum sample for your source material.
   The Proteus X Composer bank contains many good snare drum samples, or you could select a snare drum from a "beat analyzed" drum track.

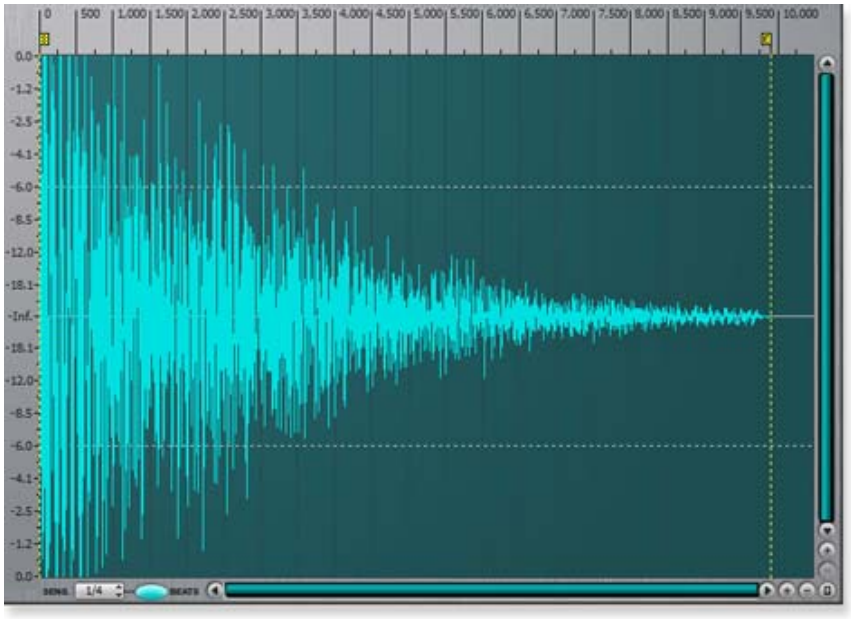


2. When you find the snare you want, **Copy** it to the clipboard (Ctrl+C).
3. Let's start with a clean slate by creating a new bank.Choose **New** from the file menu or press Ctrl+N. A pop-up dialog box will ask if you want to save your changes. Choose **No**.
4. Click on the Samples folder in the Tree and select **Paste** from the Edit menu (or press Ctrl+V). Press **OK** when the paste dialog box appears. The sample is now part of your new bank. The display probably looks similar to the one shown below.

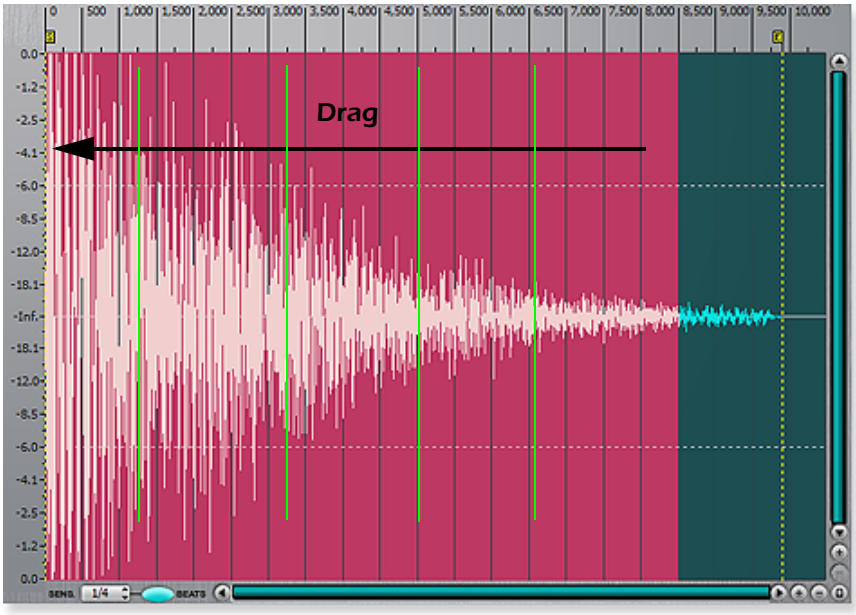


Loop it

5. Turn Looping on by pressing the **Loop Enable** button above the display. Yellow loop markers appear at the start and end points of the sample.

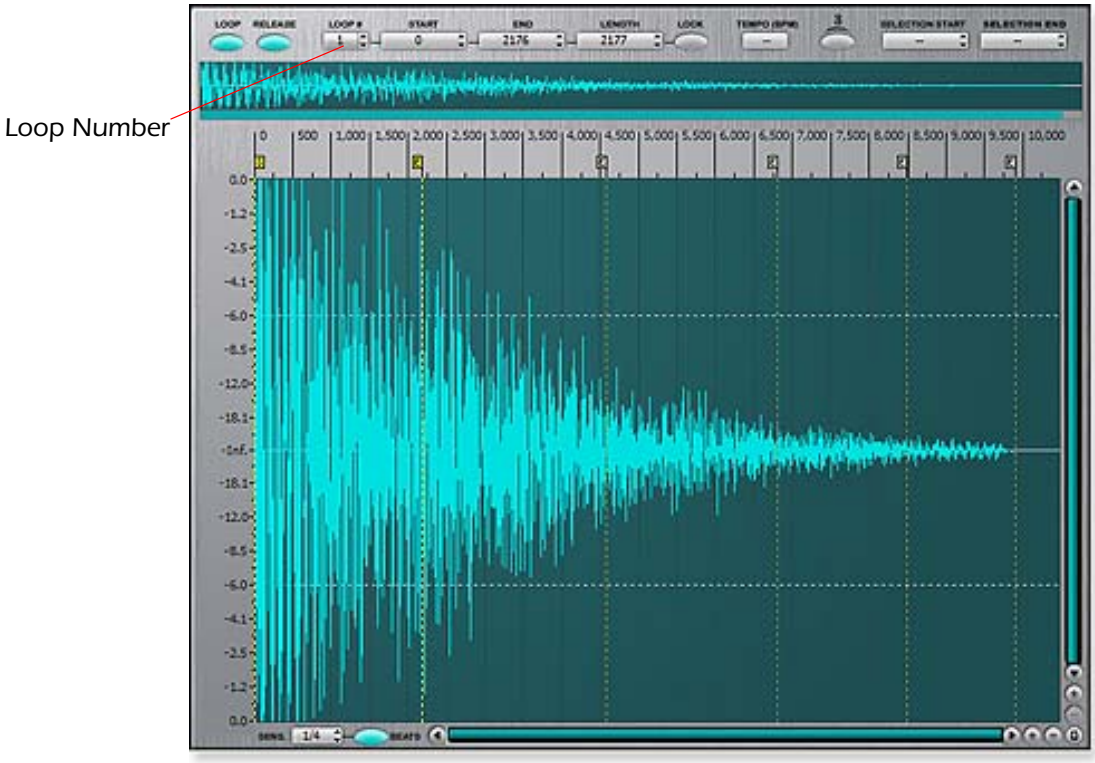


6. Now we have one loop, but we need a few more. Place the cursor a little way in from the end of the sample as shown below and drag to the beginning of the sample.



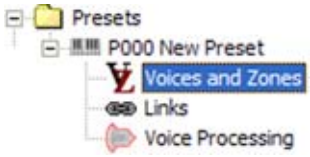
7. Select **Make Loop From Selection** from the Sample Loop pull-down menu or press **Ctrl+Shift+L**. Another set of yellow loop markers appear marking the section you just selected.

8. Now repeat steps 6 and 7, but start a little closer to the start of the sample this time. The green lines above show the approximate positions where you should start dragging.
9. Make a few more loops, moving closer to the sample start each time. The waveform display should look something like the one shown below.

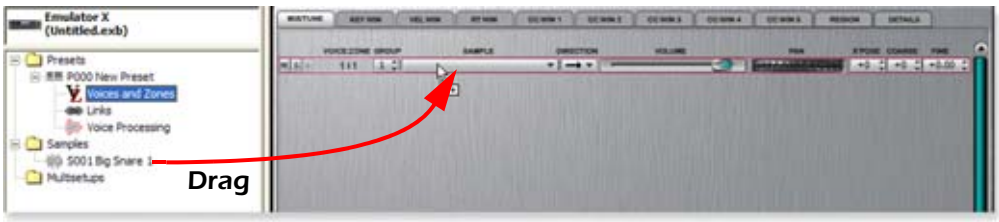


10. Increment the loop number and the currently selected loop will be highlighted in yellow. With only five loops, this is a rather coarse waveform control but it will suffice for this example. You can always add more later.

Create a Preset



11. Select the **Presets** folder in the Tree, then select **New Preset** from the Presets menu (or Ctrl+W). A new preset appears.
12. Select **Voices and Zones**. The page shown below appears.



13. **Click on your drum sample and drag it** over the empty voice as shown above. Now you can play the sample on your MIDI keyboard.

Connect the Patchcord

14. Select **Voice Processing** from the Tree. The Voice Processing page appears.

15. Connect **MIDI A** to **Loop Select (Jump)** as shown above in Cord 9. Turn the cord amount up to **100%.**
16. Play up and down the keyboard while turning the Controller Knob connected to MIDI A. Turning the knob selects the different loop points you selected. While playing higher up on the keyboard, at some point you'll notice that the drum starts sounding more like a razzy tone than a drum.

Reversing a Knob

17. As you turn up the controller knob, the drum beats slow down. Suppose you wanted to have the drum beats speed up as you turn the knob up. Here's how you reverse the action of a controller knob.
18. Set the MIDI A -> Loop Select (Jump) cord amount to -100%. Next add another Cord with **DC Offset -> Loop Select (Jump)** with an amount of **+100%**. Da-Da! Now the Cord action is reversed.

Here's the Pitch!

19. Add another cord to route MIDI A to Pitch. Now the knob will really warp the snare drum.

Filter it

20. Since we have a perfectly good filter just sitting there we might as well put it to good use. Choose a 4 Pole Lowpass (for now) and adjust the settings as shown.

21. Turn up the filter envelope PatchCord amount.

22. Now adjust the envelope settings to give a nice sweep.

23. OK, now we've got something a little different. Continue to play with the filter settings, maybe change the filter type, adjust the envelope, whatever you like.

Other Ideas

- Use the Auxiliary Envelope to change the loops instead of MIDI A.
- Adjust the position of the loops. Moving toward the beginning of the sample will raise the pitch of the sound.
- Add more loops
- Add envelope control of pitch
- Use a different sample. You've just heard what can be done using a single snare drum.

33 Voice Controlled Effects 1 - Velocity controlled echoes

The Emulator X/Proteus X allows you to control the Preset effects amount from the voice. This means that the amount is individually controllable for each key press. With this great feature you can create many wonderful effects such as:

- Velocity or pressure controlled distortion on guitars, organs or pianos
- Release velocity controlled echoes or reverb
- Chorus or Flanger amount controlled by an envelope generator or LFO.
- Ring Modulator or Pitch Shifter that only occurs during the attack.

Because the effect amounts are now controlled by your performance, this technique contains endless possibilities. Try it!

▶ How to Control the Effect Amount from the Voice

For this example, let's set up the keyboard so that echoes only occur with low velocity. When you play the keys softly, you get echoes; when you play hard, you get no echoes.

1. First, **select the preset** you want (in the tree) by clicking on the keyboard icon. The Preset Global page appears. (Choose a sound with a fast release.)
2. Click on the **Effect Select icon** at the top right corner of the Effects TV screen. A list of available effects drops down.

- **Important Note:** If a preset with effects is used on more than one MIDI channel, the CPU usage multiplies each time the preset is used.

3. Select **Delay** from the list. The Effect name is now listed above the TV screen and the effect parameters are shown in the TV screen.
4. **Play the keyboard.** You should now hear the echo. Adjust the parameters to taste.
5. Turn up the **Wet/Dry Mix** to about 86% Wet.
6. Select **Voice Processing** from the Tree for the preset you are using. The Voice Page appears.
7. Select **All** voices for processing.
8. Find an unused **Cord** and set it up like this: **Velocity + | -100% | Wet/Dry Mix**.
9. Make sure the **Wet/Dry Mix** in the Amplifier section is set to **100** (all wet).
10. **Play the keyboard** soft and hard to check it out.
11. To reverse the action (hard = echo; soft = no echo), make the **Cord amount +100** and set the **Wet/Dry Mix to 0**. (You may also want to reduce the Wet/Dry mix in the Echo effect itself to obtain the proper response.) Now that you've got it all set up, try changing the Preset Effect. Try reverb, flanger, phaser and distortion effects.

34 *Voice Controlled Effects 2 - Envelope Gated Effects*

This time we're going to set up the effects so they are gated on only when the key is released. Then, we'll add a footswitch control to enable or disable the effect.

▶ *Gating Effects Using an Envelope*

1. First, **select the preset** you want (in the tree) by clicking on the keyboard icon. The Preset Global page appears. (Yo My Dynos from the Proteus X Composer bank works well.)
2. Click on the **Effect Select icon** at the top right corner of the Effects TV screen. A list of available effects drops down.
3. Select **Phaser** from the list. The Effect name is now listed above the TV screen and the effect parameters are shown in the TV screen.
4. **Play the keyboard.** You should now hear the phaser. Adjust to taste.
5. Turn up the **Wet/Dry Mix** in the effect to about **60% Wet**.
6. Select **Voice Processing** from the Tree. The Voice Page appears.
7. Select **All** voices for processing.
8. Find an unused **Cord** and set it up like this: **Aux Env +** | **+100%** | **Wet/Dry Mix**.
9. Set the **FX Wet/Dry** in the Amplifier section is set to **0** (all dry).
10. Set up the Aux Envelope as shown below. This gives a decay curve only when the key is released.

    Release 1 Time = 0.370; **Release 1 Level = 100**; **Release 2 Time = 2.848**

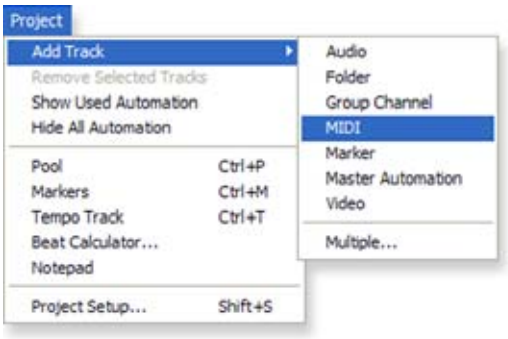
11. **Play the keyboard** and hold the keys down. No Phaser. Now release the keys. Phasey!
12. Now you'll want try out all the different effects. And of course, you can alter the shape of the envelope.
13. To turn the effect on and off using a footswitch, simply set the amount of the Aux Env Cord to +0.00. Next, set up another cord like this: **Footswitch | +100 | Aux Env Cord Amt**. The effect will only be heard on release IF the footswitch is depressed.

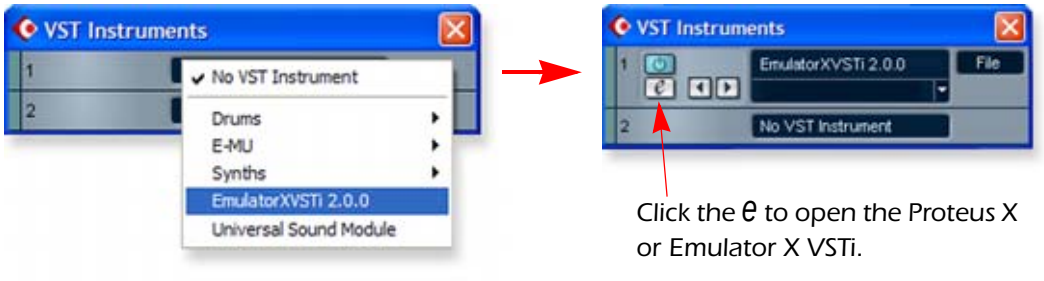
35 Assigning Multiple VST Busses in Cubase LE

In this tutorial we'll show you how to assign MIDI channels to separate VST busses and then assign different VST effects to each bus. Bussing MIDI channels also allows you to separately EQ each MIDI channel if you so desire.

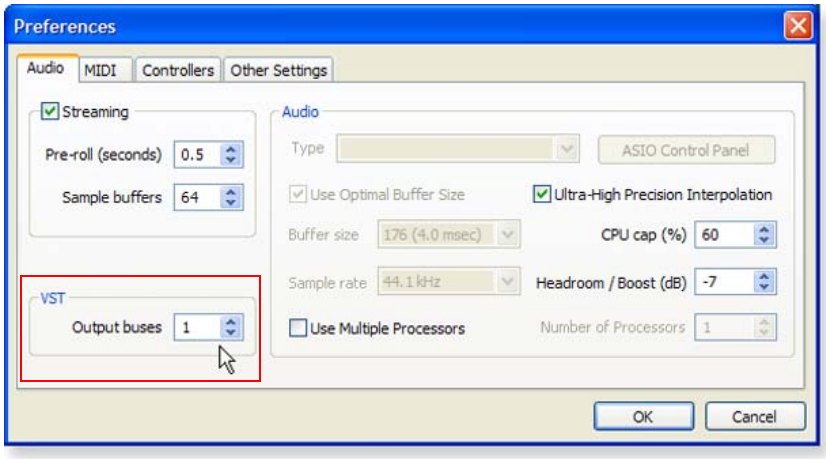
▶ To Assign Multiple VST Busses:

1. **Open Cubase LE**.
2. Select **New Project** from the File menu. When asked, select **Empty**.
3. From the **Project** menu, select **Add Track, MIDI**. An empty MIDI track appears. Create 3 MIDI tracks.
4. From the **Devices** menu, select **VST Instruments**. The VST Instrument dialog box appears.
5. Click in the field that says **No VST Instrument** and a pull-down menu appears. Select the **Emulator X** or **Proteus X** VSTi.

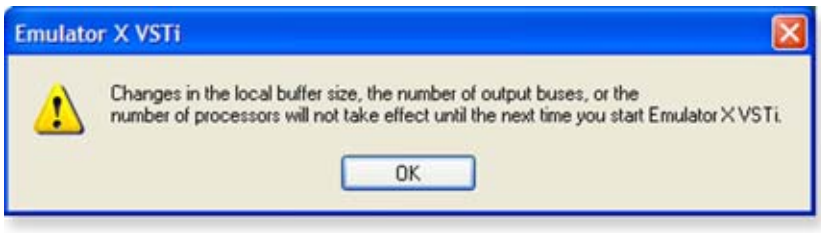




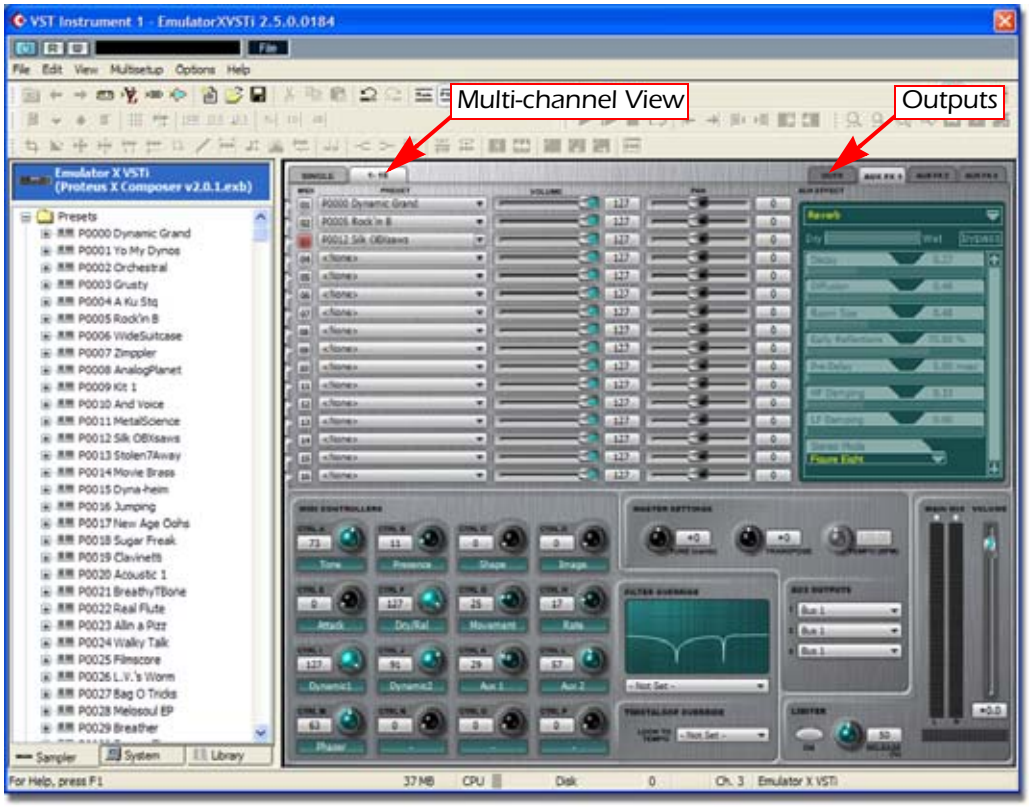
6. Click the e in the VSTi instrument dialog box to edit the instrument. The Proteus X or Emulator X main page appears.
7. From the Options menu, select Preferences.



8. Select the number of output buses you wish to use. For the purposes of this tutorial, select **3 Output Buses**. Click **OK**. The following dialog box appears:


Emulator X VSTi
Changes in the local buffer size, the number of output buses, or the number of processors will not take effect until the next time you start Emulator X VSTi.
OK

9. This means that you'll have to select **No VST Instrument** in the VST Instruments dialog and then **repeat steps 6 & 7**.
10. When the Emulator X / Proteus X is back in view, **Open a bank** from the File menu. For the purposes of this tutorial, select **Proteus X Composer**. *(The one bank everyone has.)*
11. **Click on the 1-16 tab** to select the Multi-channel view.

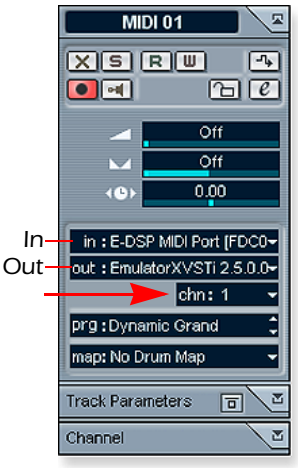


12. Assign presets to channels 1, 2 and 3.
13. **Select the OUTS tab.** This is where you assign MIDI channels to busses in the Proteus X or Emulator X. **Assign the first three channels to Busses 1, 2 and 3** as shown at right.

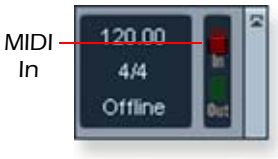
- Note that the Aux Outputs can also be assigned to busses. Using the Aux Outputs allows you to control the send amount from each voice if you so desire.

14. Now that you have the busses assigned to MIDI channels, you can close both the Proteus X / Emulator X editor and the VST Instruments dialog box.

Connect MIDI



15. The next step is to connect your MIDI keyboard to the track and the track output to the Emulator X / Proteus X.
16. If the "Inspector" pane (shown at right) is visible on the left side of the Cubase window, you can go on to the next step. If it's not visible, click the **Show Inspector** button just below the Cubase title bar.
17. Select MIDI Track 1 by clicking on it and click anywhere inside the **In** field and choose your MIDI interface.
18. Click anywhere in the **Out** field and choose either the **EmulatorXVSTi** or **ProteusXVSTi**.



19. **Play your MIDI keyboard.** You should see MIDI activity on the **MIDI Activity Indicator** on the Cubase Transport Panel.
20. You should also be hearing the Emulator X / Proteus X. If not, check that the MIDI track is **Record Enabled** with the button showing red.
21. If you still aren't hearing sound, **open the Emulator X / Proteus X editor** again by clicking the **Edit button** in the Inspector pane. Click the Mini Keyboard button, then play the mini keyboard with your mouse. If you hear audio, you have a MIDI connection problem. If you don't hear audio, then you have an audio connection problem.

Set up MIDI Tracks 2 and 3

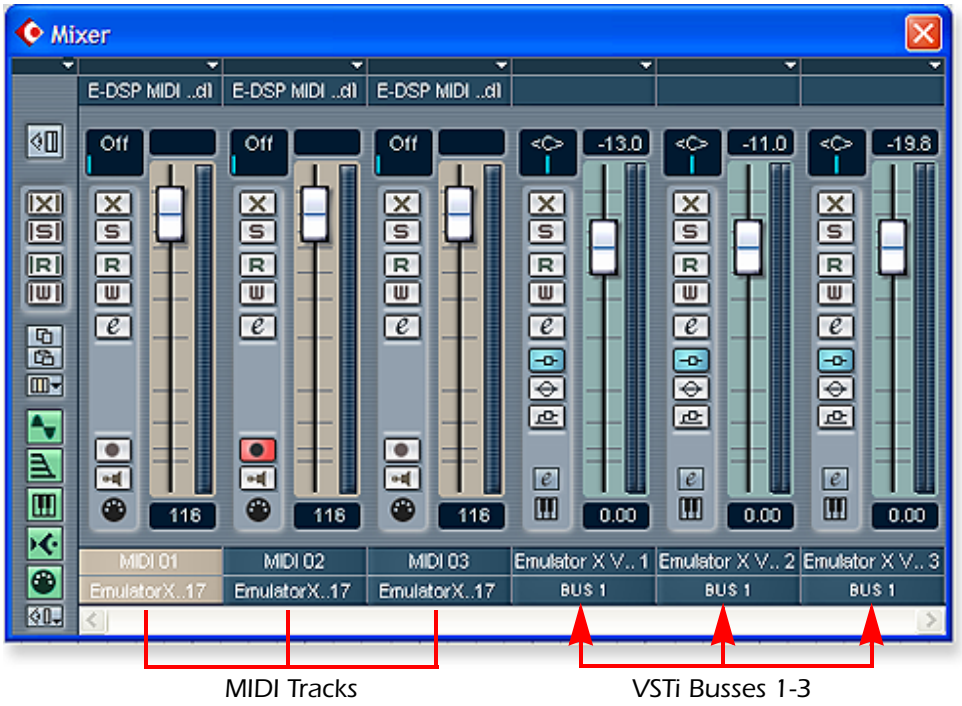
22. Select MIDI track 2 by clicking on it and **set the input and output as you did in steps 18 and 19.**

23. Make sure the Channel (chn) field is set to:
chn 1 for track 1
chn 2 for track 2
chn 3 for track 3

- **Explanation:** When the chn field is set to a channel number (1-16), Cubase accepts any MIDI channel number from your MIDI keyboard and reassigns it to the number you have selected.

Connect a VST Effect to Bus 1

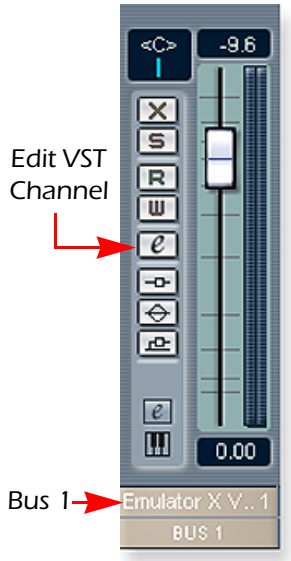
24. From the Devices menu in Cubase, **select Mixer** (F3). The track mixer window appears. Note that there are 3 tracks associated with the Emulator X or Proteus X busses you created.



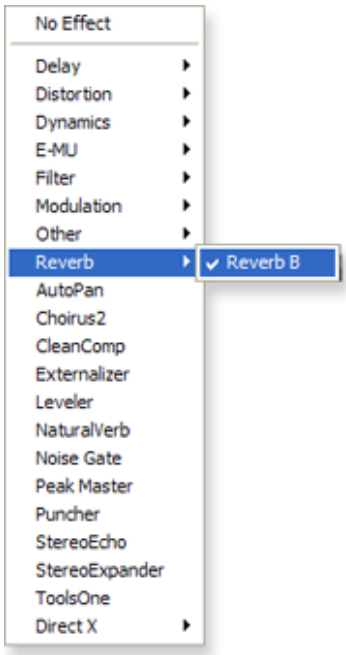
It's a little confusing because the bottom lines all say "Bus 1". Click on the top line labels to see the connection.

Click →

25. Click on the **Edit VST Channel** button, on Bus 1 as shown at right. The VST Channel Settings window, shown below, opens.



26. **Click inside the field that reads "No Effect"** and the list of available VST effects appears. In this example we have a Grand Piano on MIDI Channel 1 (and Bus 1), so we've chosen **Reverb B** from the Cubase VST collection.



27. The Reverb B controls appear. Play your MIDI keyboard and select a reverb preset or set the controls to your taste.

Connect a VST Effect to Bus 2 and Bus 3

28. **Hit the F3 key** to bring the Mixer up front.
29. Click on the **Edit VST Channel** button, on Bus 2 and the VST Channel Settings window appears.
30. In this example we have a B3 Organ on MIDI Channel 2 (and Bus 2), so we've chosen **Distortion** for this bus.
31. The Distortion controls appear. Play your MIDI keyboard and select a distortion preset or set the controls to your taste.
32. **Repeat the last three steps for Bus 3.** Choose a **Delay** for Bus 3.

Equalization

33. You must have noticed the four-band equalizer on the VST Channels Settings page. Another advantage of using multiple busses is that you can apply separate EQ to each of your MIDI tracks.

Recording

We should probably finish up by telling you how to record your 3 MIDI tracks.

34. You now have 3 MIDI tracks all set up to record. All you have to do is select the track and hit **Record,** then **Play** on the Cubase Transport Panel.
35. To record the next track, hit **RTZ** on the Cubase Transport, select the next track and hit **Record,** then **Play** to begin again.

Advanced Applications

Have you ever wanted some special feature on your instrument and wished you could write the software to add it? Well, in many cases you CAN create up your own custom features using a little creativity and the extensive patching capabilities of the Emulator X and Proteus X.

When using a synthesizer of this depth and complexity there is almost always more than one way to achieve your desired result. Try to approach the problem from a different mindset. Even if your first solution doesn't work, you might discover something new and exciting - or even the synthesist's holy grail of discovering an entirely new sound or effect.

Our sincere hope is that these lessons may stimulate your imagination as to the infinite possibilities of using these powerful musical tools.

36 Sostenuto Pedal

A sostenuto pedal sustains any notes being held at the time the pedal was pressed, but doesn't sustain notes played afterwards. Sostenuto is usually only found on expensive pianos, but it is an extremely musical control. It's even more useful on a synthesizer since you can infinitely hold the notes.

The Emulator X/Proteus X doesn't have a dedicated Sostenuto pedal feature, but this great feature can be implemented using the incredible power of the Patchcords. The patch is a little complicated and uses up six patchcords, but it works.

A complete explanation of the patch is given for those interested, but you can still use the patch whether you understand it or not.

▶ Before you Begin

1. Make sure you have a sustain footswitch connected to your MIDI controller and that it is working. We use Footswitch 1 for this example.
2. **Choose a preset that sustains** when you hold the keys down.
3. Look through the four pages of the Patchcords and **turn off Footswitch 1** wherever you see it. **Alternatively**, If you have two footswitches, you can leave Footswitch 1 connected as a Sustain pedal and use Footswitch 2 for the Sostenuto pedal.

▶ To Program a Sostenuto Pedal:

1. This patch requires 6 consecutive patchcords. The order of each cord is important, so program the patch EXACTLY as shown below.

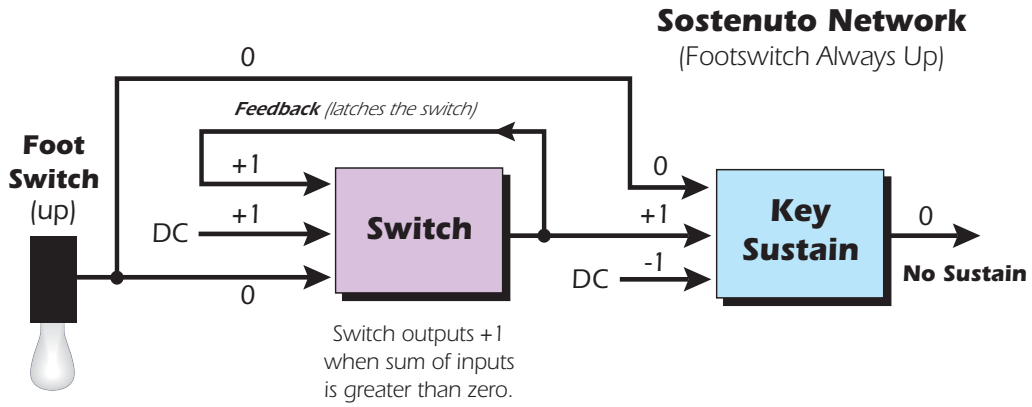
Sostenuto Pedal Patchcords

Source	Amount	Destination
DC Offset	+1.00	Switch
Footswitch1	-1.00	Switch
Switch	+1.00	Switch
Switch	+1.00	Key Sustain
Footswitch1	+1.00	Key Sustain
DC Offset	-1.00	Key Sustain

2. Play a chord, then press the footswitch. Play some more notes and notice that they don't sustain. Only notes being held when the switch was pressed will sustain.

▶ How it Works

Refer to the block diagram of the patch as shown below. We'll analyze the three possible states of the keyboard keys and footswitch in relation to the **Switch** and then the **Key Sustain** modules. It's important to realize that the state of the network is calculated for EACH KEY pressed and that lower numbered Cords are calculated first.



Footswitch Always Up

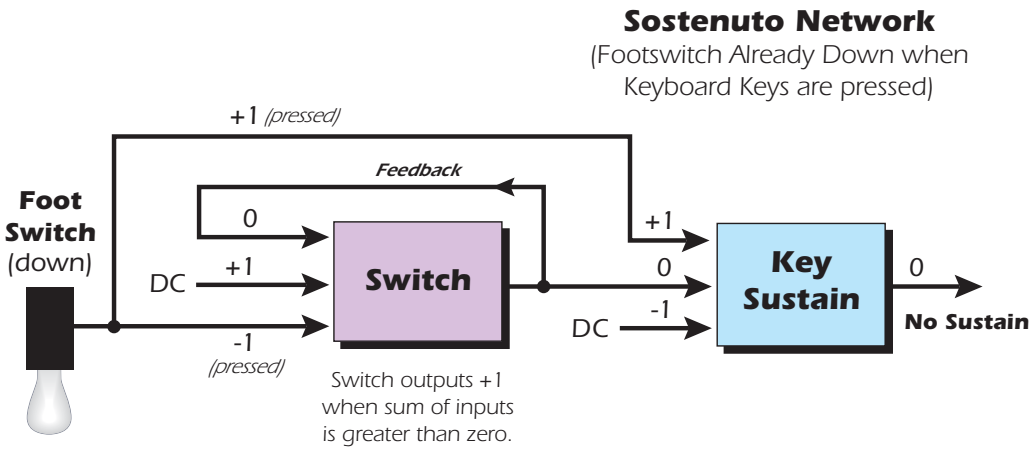
1. If the Footswitch never goes down, the network doesn't affect Key Sustain. The algebraic sum of the three Switch inputs is positive and so the output of the Switch is high (+1). The **Switch** inputs are calculated below.

   FtSw = 0
   DC = +1
   Switch = +1 *(feedback from output)*
   SwOut = +1

   Because the output of the Switch feeds back into itself, it **Latches** the current state, which in this case is +1.

   The algebraic sum of the Key Sustain input is zero and therefore no sustain occurs. The **Key Sustain** inputs are calculated below.

   Switch=+1
   FtSw = 0
   DC = -1
   KeySus =0



Footswitch already Down when Keyboard Keys are pressed

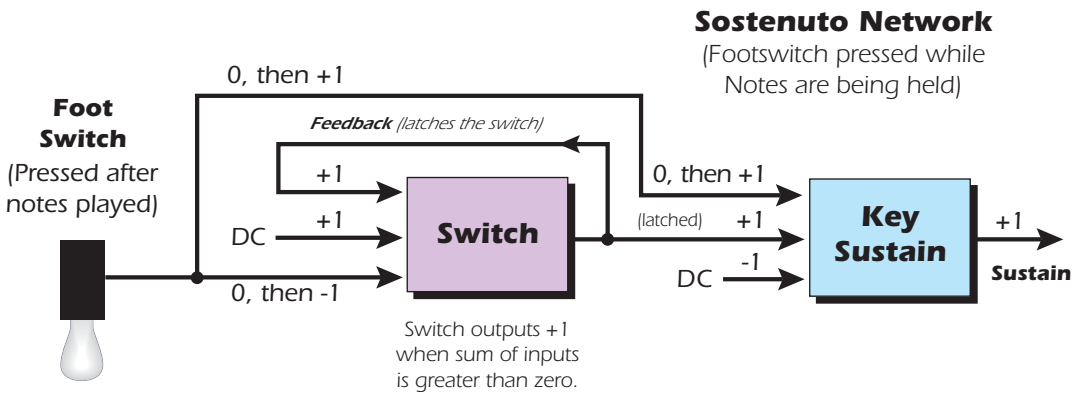
2. If the Footswitch is already depressed when keyboard keys are pressed, the network doesn't affect Key Sustain. The algebraic sum of the Switch input is 0 and so the Switch output is Low (0). **Switch** inputs are calculated below.

   FtSw = -1
   DC = +1
   Switch = 0 *(feedback from output)*
   SwOut = 0

   Because the output of the Switch feeds back into itself, it **Latches** the current state, which in this case is 0.

   Again, the algebraic sum of the Key Sustain input adds up to zero and therefore any played keys do not sustain.
   The **Key Sustain** inputs are calculated below.

   Switch = 0
   FtSw = +1
   DC = -1
   KeySus = 0



3. **The Sostenuto Pedal -** The Sostenuto action occurs ONLY when the footswitch is pressed while keyboard keys are being held.

We begin with the state described in Step 1 with the pedal in the up position. Played notes do not sustain.

FtSw = 0
DC = +1
Switch = +1 *(feedback from output)*
SwOut = +1

Because the output of the Switch feeds back into itself, it **Latches** the current state, which in this case is +1.
Now the Footswitch is pressed. The output of the Switch remains latched.

FtSw = -1
DC = +1
Switch = +1 *(feedback from output)*
SwOut = +1

The algebraic sum of the Key Sustain input now adds up to +1 and so **any notes held at the time of the footswitch depression will sustain.** The footswitch change of state causes the Sostenuto action.

Switch = +1
FtSw = +1
DC = -1
KeySus = +1

Any new notes played after the footswitch depression fall into the category described in step 2 and will NOT be sustained.

Although this example was particularly complex and the explanation somewhat long-winded, it illustrates the concepts of Patchcord feedback and latching.

Now that you know the trick, you can latch any Patchcord destination using the Sostenuto-type action. Just substitute the parameter you want to latch instead of Key Sustain.

Tip: You probably already know this, but if you don't want the Sostenuto action and just want a regular footswitch to latch (press once-on; press again-off), all you have to do is substitute a **FF Footswitch** for the regular footswitch in the PatchCord sources.

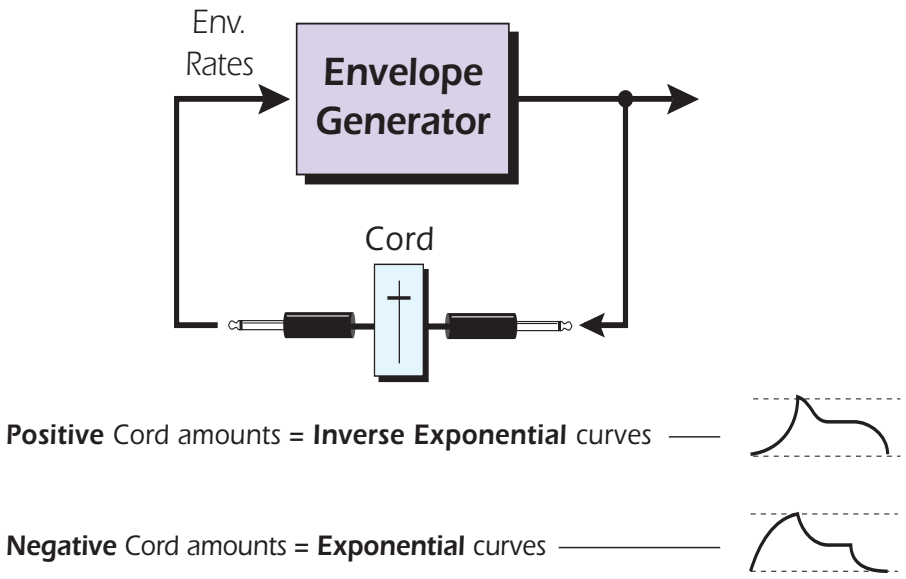
37 Creating Unusual Envelopes

The envelope generator timings can be modulated with anything—an LFO, keyboard velocity, keyboard key, or even the output of the envelope generator itself!

Envelope Self-Modulation

For example, modulating the Attack with the envelope's own output (positive modulation) results in an attack time that gets faster and faster as the attack progresses.

Positive self-modulation on the envelope rates creates Logarithmic curves. Negative self-modulation on the envelope rates creates Exponential curves. Exponential curves are nice to use with slow string attacks, while logarithmic curves work well for pitch bends. You can even modulate the Cord amount, (with key or velocity, for example) to dynamically change the envelope shape.



▶ To Change the Shape of the Envelope:

1. Open any preset and open the **Voice Processing page**.
2. Select **All Voices** in the voice selector.
3. Find two unused Patchcords and program them as shown below.

Cord	Source	Amount	Destination
28	Aux Env +	+12.00	Aux Env Rates
29	Aux Env +	+21.87	Pitch

4. Adjust the Aux Envelope curve as shown below. You should hear the pitch slowing rising when you play a note.

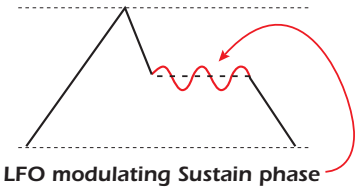
5. Increase the amount of Cord 28 to about +75. Play a key. You should now hear the Attack increase speed as it nears 100%.
6. Set the Envelope Attack time to .4 seconds and set Cord 28 to -60. Play a key. Now the attack starts fast and slows at it nears 100%.
7. Since we're modulating ALL the rates, all stages of the envelope will be affected by the self-modulation. Try adjusting the decay and release times and note the effect.
8. Change the destination of Cord 28 from **Aux Env Rates** to **Aux Env Attack**, or **Aux Env Decay**. Now the self-modulation only affects a single stage.

LFO Modulation of Envelope Sustain

You can patch an LFO to modulate the Sustain segment of an envelope so that the LFO only comes in during the Sustain phase of the envelope. The Attack Decay and Release rates can also be modulated with an LFO, although the effect is a little more subtle.

▶ ***To Modulate Envelope Sustain with an LFO:***

1. Set the Aux Envelope approximately as shown below.



2. Set up the Patchcords as shown below and play the keyboard.

Cord	Source	Amount	Destination
28	LFO 1 ~	+50.00	Aux Env Sustain
29	Aux Env +	+21.87	Pitch

3. Try modulating the envelope rates with the LFO. You may have to adjust the initial rates in order to hear the effect.

38 Resampling

Although there is no dedicated “Resampling” feature on the Emulator X, you can resample the output with a bit of patching. Resampling allows you to include modulation, filters and effects in your sample, or you can record runs or chords, or a even an entire song. The basic idea of resampling is to make the Emulator X output available as an ASIO input to the Record Audio dialog box. This is pretty simple. Here’s how:

▶ To Resample the Emulator X using PatchMix DSP:

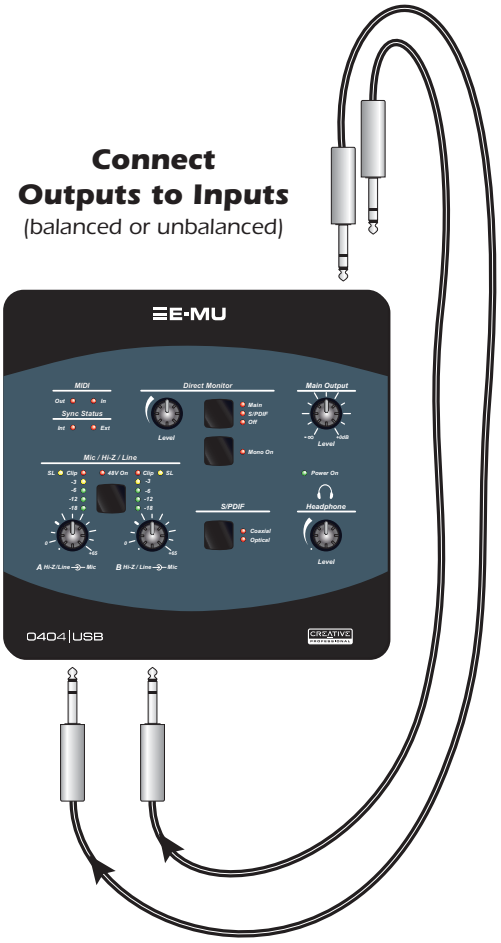
1. **Open Emulator X in standalone mode** (not as a VSTi), and select the preset you wish to resample.
2. **Open PatchMix DSP** by clicking on the EMU icon in the Systray.
3. Play your MIDI keyboard and **determine which input strip Emulator X is using** by observing the peak meters. (You can right-click to add peak meters to the channels if there are none.)
4. **Add an ASIO Send** to the input channel used by the Emulator X.
5. Select **Acquire Samples** from the Emulator X File menu (Ctrl+Q).
6. **Press the Record button** from the “Acquire/Chop Samples” dialog box. The “Record Audio” dialog box appears.

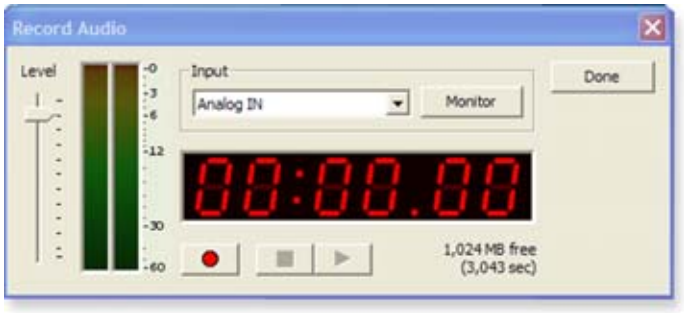
7. **Select EX Main** as the Input. If EX Main doesn’t appear, make sure you’ve loaded the default Emulator X template in PatchMix DSP. Make sure that the Monitor button is off (as shown) or you will hear annoying feedback as soon as you play the Emulator X.
8. **Play your MIDI keyboard.** You should hear it and see activity on the meters in the Record Audio dialog box above.
9. Press the red **Record button**, then start playing.
10. Press the **Stop button** when you’re finished resampling.
11. Continue to chop and process your samples.

▶ To Resample the Emulator X using an E-MU 0404 USB

(or another audio device)

1. **Open Emulator X in standalone mode** (not as a VSTi), and select the preset you wish to resample.
2. **Connect the Outputs to the Inputs** of your audio device.
3. Play your MIDI keyboard and **set the input levels** on your audio I/O device. The meters should not clip.
4. Select **Acquire Samples** from the Emulator X File menu (Ctrl+Q)
5. **Press the Record button** from the "Acquire/Chop Samples" dialog box. The "Record Audio" dialog box appears.





6. **Select the proper input** as the Input.
   (0404 USB shown) Make sure that the Monitor button is off (as shown) or you will hear annoying feedback as soon as you play the Emulator X.
7. **Play your MIDI keyboard.** You should hear it and see activity on the meters in the Record Audio dialog box above.
8. Press the red **Record button** ⏺, then start playing.
9. Press the **Stop button** ⏹ when you're finished resampling.
10. Continue to chop and process your samples.

▶ Digital Resampling without PatchMix

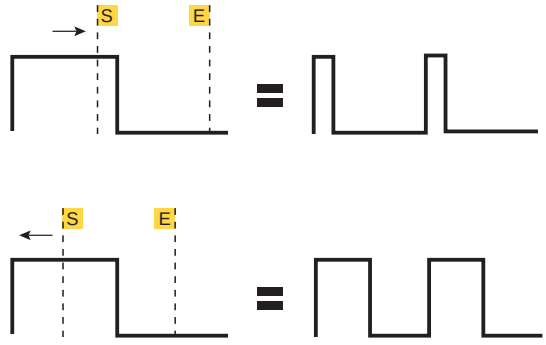
This should work depending on your audio device. At the time of this writing the 0404 USB could not resample using S/PDIF, but this issue should be addressed in a future software version.

Resampling using S/PDIF should work just like analog resampling. Patch input to output, then set the Emulator to output S/PDIF in the Multisetup and input S/PDIF in the Record dialog box.

39 Pulse-Width Modulation

They said it couldn't be done! It's true, you can produce true pulse width modulation (PWM) using the Emulator X.

The basic idea of pulse-width modulation is to start with a looped single-cycle wave, then dynamically move the loop location so that different portions of the waveforms are included. Changing the loop length will change the pitch of the sample, but this is easily corrected using the Transpose and Tuning controls in the Voice. The diagram below illustrates the principle.



Pulse-Width Modulation

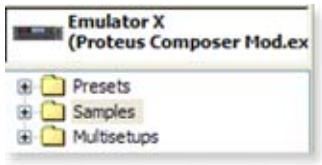
The loop length is fixed, then the loop position is modulated with an LFO or Envelope so that it changes the duty cycle of the waveform.

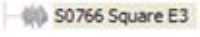
▶ To Pulse-width Modulate a Square Wave:

1. Turn **Streaming Off** in the Options, Preferences menu. Pulse width modulation needs to have the entire sample loaded into RAM for proper operation.
2. Load the **Proteus X Composer** bank.

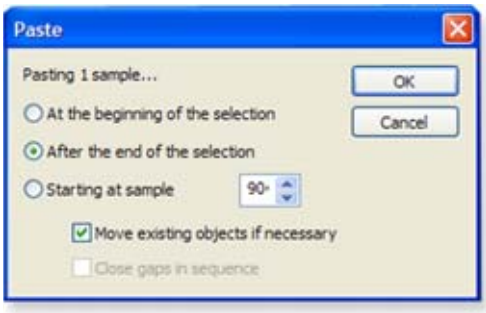
Copy the Sample

3. Select the **Samples** folder in the Tree.



4. Open the **Samples** folder by clicking on the (+) symbol.
5. Locate sample S**0766 - Square E3** in the Tree, and select it. 

6. Select **Copy** from the Edit menu.
7. Select **Paste** from the Edit menu. The following dialog box appears.



8. Choose Pasting 1 sample "**After the end of the selection.**" Also choose "**Move existing objects if necessary.**"
9. A duplicate of Square E3 appears in sample location S0767.

10. **Right-click on S0767**, then choose **Rename** (F2).
11. Rename the sample to **PWM E3**.

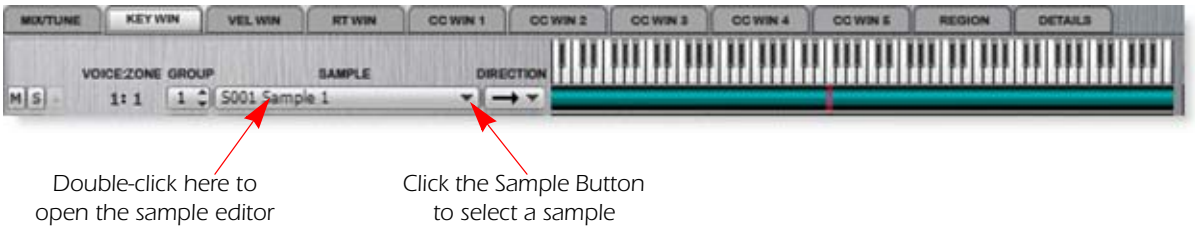
Create a new Preset

12. Select the **Preset folder** in the Tree.

13. Select **Presets, New Preset** from the menu bar.
14. **Open the Preset Folder** by clicking on the (+) symbol and scroll down to the bottom of the preset list. A new empty preset has been created at the bottom of the Tree (location P1026).
15. It's always a good idea to rename your new preset to avoid confusion later. (Right-click on the preset name, then choose **Rename** or press **F2**.)

Assign the Sample

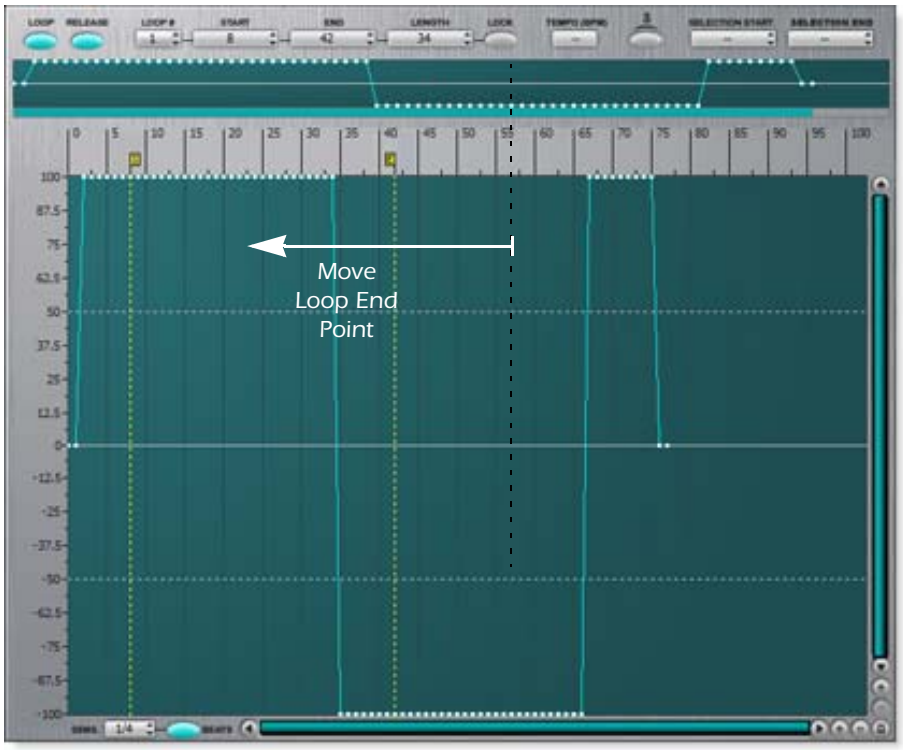
16. Open the preset by clicking on the (+) symbol next to the little icon.
17. Open the Voices and Zones module. The Key Window appears.



18. Select sample **S0767 - PWM E3** (a pulse width modulation sample).

Adjust the Loop Markers

19. **Double-click on the sample name** to open the sample editor.
20. Move the Loop End Point by dragging the marker or by typing in a value into the End field. We have chosen a value of 69 samples for the loop length in the example above. The distance from the start point sets the initial pulse width and pitch of the sample.
21. It's easy to see how the loop will move if you click the **Lock** loop length button and then move the loop start point. Try this and note how the pulse width changes inside the loop markers. When you're finished, move the loop start point back to 8 samples and the end point to 77 samples (Loop Length = 69 samples).



Retune the Sample

22. Unfortunately, because we changed the loop length, the waveform is no longer tuned to E3. Fortunately, this is easy to fix. Click the **Back** Arrow to jump back to the Key Window.
23. Select **New Voice** (Crtl+W) from the Preset menu. A new empty voice appears.
24. Click the button next to the voice and select sample **S0766 - Square E3** (the original square wave sample).
25. Click the **Mix/Tune** button. The Voices and Zones page should look like this:

26. Play the keyboard. Both voices will sound and they will be horribly out of tune. Adjust the **Transpose** and **Fine Tune** controls on **Voice 1** until they are in tune. Now the PWM E3 voice is back in pitch.
27. **Select Voice 2** (S0766 - Square E3) and select **Delete Voices** from the Preset menu since it's no longer needed.

Connect the Modulation Cords

28. Select the **Voice Processing page** from your new preset **(P1025)** in the Tree. The voice processing page appears.
29. Set up the Cords as shown at left. You only need to change two parameters. Set Cord 3's destination to **LFO~ to Sample Loop**, and change the Amount of Cord 4 to **-2.00.**
30. Play the keyboard and turn up the Mod Wheel. You should now be hearing rich, luscious pulse width modulation.
31. You might want lower the frequency of LFO 1 for a better chorale effect.

40 Quad Panning and 3D Effects in Stereo

This effect swirls the sound around four speakers using the LFO. Since the patch is in the voice, each key will have its own circular pan.

Incidentally, you can try out this effect even if you don't have a multi-channel speaker system. A great pseudo-surround effect can be created with only two speakers by assigning a reverb to the rear channels. It's a very cool effect.

At first glance, the Emulator X and Proteus X appear to be stereo-only instruments with no provision for surround sound. But wait, there are actually four stereo outputs and the amounts all four stereo buses can be modulated by any of the voice modulation sources. There ought to be a way, and there is!

The trick to implementing a smooth quad panning effect is to use something called a quadrature sine wave, or two sine waves 90 degrees out of phase with each other. One sine wave moves the panning left and right and the one shifted 90 degrees out of phase pans the sound front to back.

The easiest way to do this on the Emulator X or Proteus X is to use two sine wave LFOs and shift one of them 1/4 cycle using the delay parameter.

▶ To Implement Quad Panning:

1. Let's start by loading the **Proteus X Composer** bank.
2. Select **P002 Orchestral** from the Tree.
3. **Open the preset** by clicking on the (+) symbol next to the icon.
4. Select the **Voice Processing** page.
5. Select **All** in the Voice Selector to select all voices for processing.
6. Select the **LFO/LAGS** page by clicking on the tab.

7. Select **Sine** for both LFOs and set up the parameters as shown with a Frequency of **1 Hz** and a delay of **.25 seconds** for LFO 2. (One quarter of a cycle equals 90 degrees.) Make sure **Key Sync** is on.
8. Now moving over to the Cords section, select the 19-27 tab, which has a few available cords.

9. The Cord patching is shown at right. LFO 1 is being used for the left-right **Amp Pan** and LFO 2 is handling the front-back movement by controlling the **Main** and **Aux 1 Sends**.

10. The front-back panning works a little differently. The Main and Aux Sends have a range of 0-100 so we use two Cords, one to turn the Main (front) channels down from its normally-on state, and a second Cord to turn the Aux 1 Send up from its normally-off state.

11. The initial amount of the Main is already 100% and the initial amount of the Aux 1 Send is already set to 0%, so you don't have to change these. The main point here is that the inverted polarity of Cord 23 turns the Main amount down at the same time that Cord 24 is turning the amount of Send 1 up. And because LFO 2 is 90º out of phase with LFO 1, the circular panning motion is achieved.

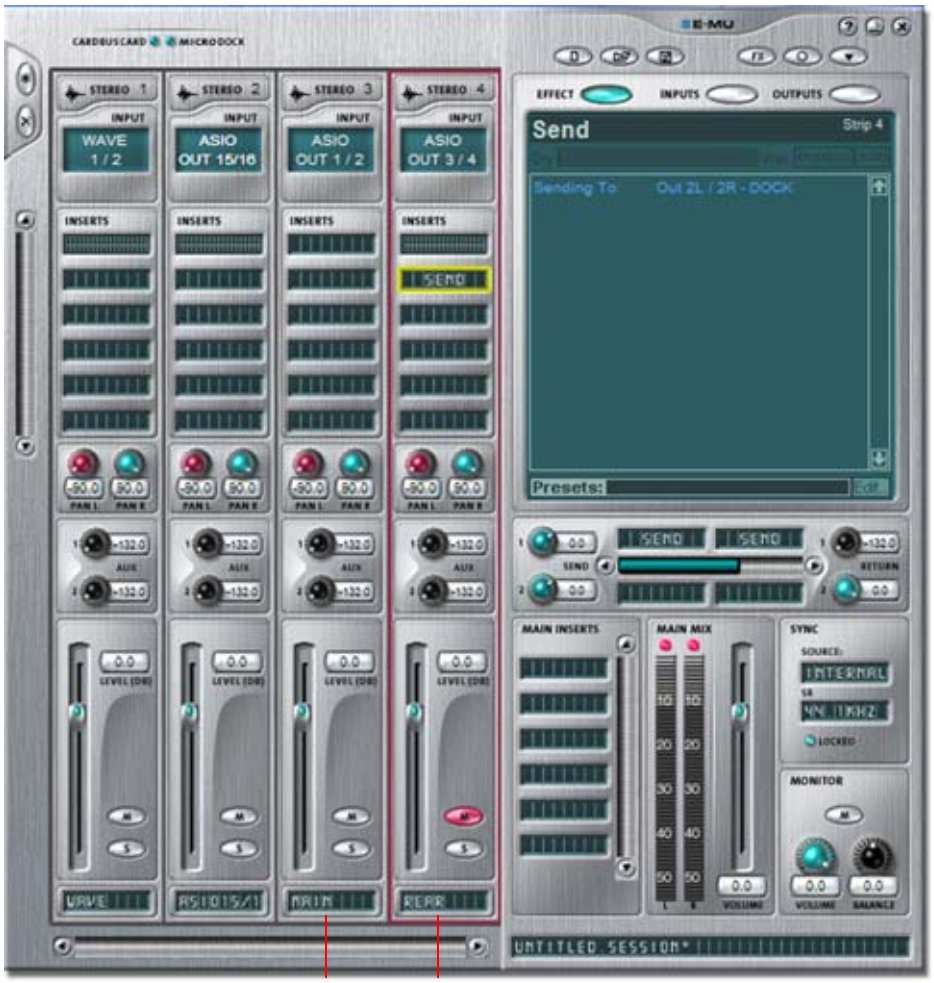
12. You will probably want to turn **Classic Response Off** to get a more natural sounding panning effect. *(Classic Response is only used for Emulator IV compatibility.)*

13. Turn down **Aux 1** (CTRL K Initial MIDI Controller Amount (Multisetup screen) since this is turned up slightly in the Orchestral patch.

Routing your Outputs

14. Now we need to send the output of Aux 1 to its own pair of ASIO channels on your sound card. Click the Emulator X (or Proteus X) icon above the tree to return to the main screen. Set Aux Output 1 to another set of outputs on your sound card. We're using an E-MU 1616M and using Dock Outputs 2L & 2R for the rear channels.

15. Here's how the PatchMix session looks. Remember that you have to create ASIO strips BEFORE they will appear in the Emulator X or Proteus X application. Here we have created an ASIO 3/4 strip for the Rear channels and Muted the strip to disconnect it from the Main outs (our front speakers).



16. The patch is now complete. The sound spins in a circle panning between four speakers. To make the rotating less severe, slightly decrease the Cord amounts controlling the panning.

- You can incorporate quad panning into your existing 5.1 surround setup by simply ignoring the center and sub speakers.

▶ 3D Stereo-Holo-Simulacra™

17. At the beginning of this tutorial, we mentioned that you could use this trick in stereo to create a pseudo-quad effect. Here's how.
18. Set the **Aux 1 Output** to **Main**.
19. Set **Aux FX 1** to **Reverb** (or Phaser or ??). The reverb effect simulates the rear channels and adds a nice three-dimensional quality to the sound. In fact, this might be the beginning of a nice Leslie (rotating) speaker effect.

- **Other Ideas:** Use envelope generators, function generators or MIDI controllers to control the panning. Try using non-synced LFOs with different shapes.

41 X-wave Synthesis

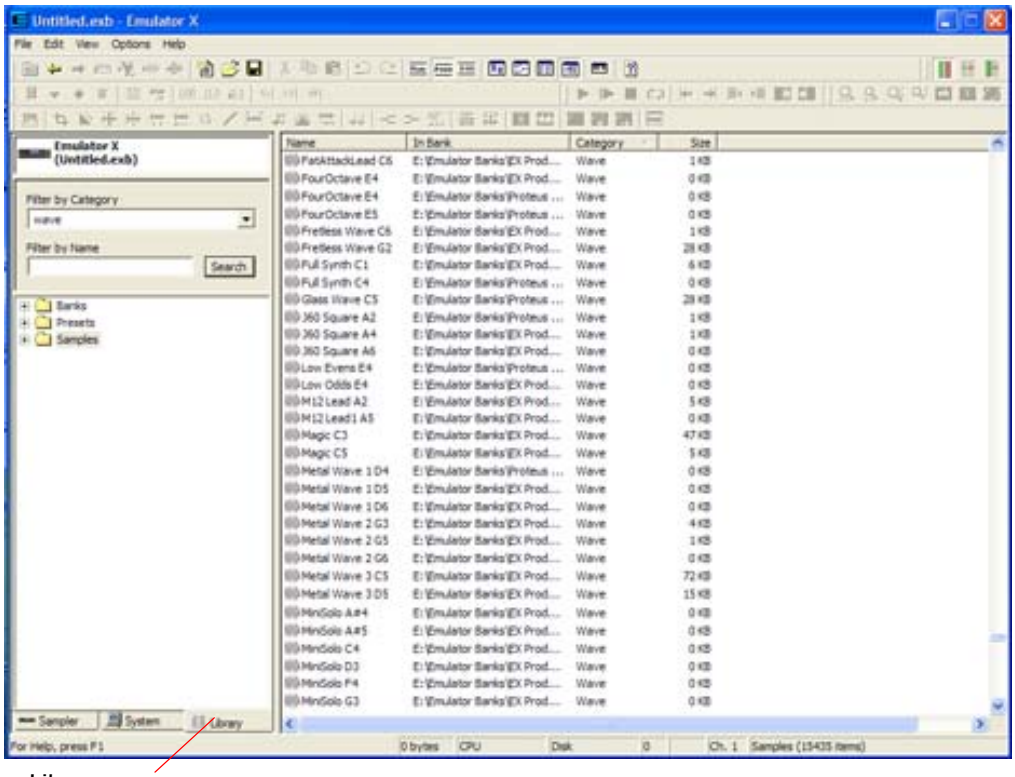
This patch is based on classic instruments such as the PPG 2.2, Waldorf wave and Sequential VS. Rather than spending your money on another synth, you can patch up your own crosswave synthesizer on the Emulator or Proteus X.

▶ Locate Samples and Load them into the Bank

1. Make sure you have either the Proteus Composer or Proteus X Composer bank on your hard disk.
2. Let's start with a clean slate. Select **New** from the **File** menu.
3. The easiest way to find samples is using the Library feature. Click the **Library** Tab at the bottom of the Tree.

- **Important:** If the Librarian doesn't find the samples, select **Update Library** from the **File** menu. *(You need to have Proteus X Composer in your System.)*

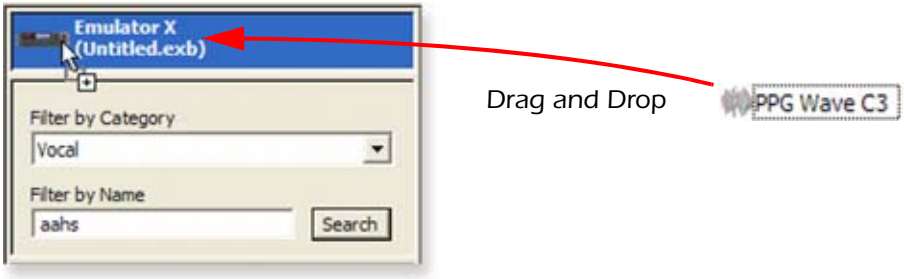
4. Select **Wave** as the Category, and leave the 'Filter by Name' box blank. Click **Search**.



Library

5. Clicking on the **Samples Folder** in the Tree displays the expanded list in the main window.
6. The window should look something like the one shown above, although you may have more samples shown, depending on the size of your sample library.

7. Browse through the Wave samples until you find one that you think you might want to use. **Click on the sample name** and hit the **Space-bar** on your computer keyboard to audition the sound from the hard disk.
8. If the sound doesn't stop on it's own, hit the **Space-bar** again to **Stop**.
9. When you find an interesting wave sample, select the sample while holding the mouse button, drag and drop it on top of the Emulator X/Proteus X icon above the Tree as shown below.



10. Continue browsing the wave samples, auditioning them and adding them to the bank. Choose about five or six waves.
11. Click the **Sampler** Tab at the bottom of the Tree, then double-click the **Samples Folder** to open it. You'll notice that the samples have now been added to the Bank.

Time to Save?

12. Have you have done enough work that you'd HATE to lose it? If so, then it's time to save.
13. Select **Save As...** from the **File** menu, choose a location where you can find it again (the desktop?), and press **Save**.

▶ *Placing the Samples on the Keyboard*

1. Click on the **Presets Folder** in the Tree, then select **New Preset** (Ctrl+W) from the Presets menu. A new preset appears in the Tree.
2. Select **Voices and Zones** in the new preset. The Voices and Zones page appears.
3. Select the first sample from the list in the Tree, then **drag and drop it** over the empty sample location as shown below.

4. **Click the KEYWIN tab.** A green bar appears across the entire keyboard range indicating that the sample is transposed across the entire keyboard.

The red bar shows the original key. Because the original pitch of the sample (A2) is included in the name, Emulator X/Proteus X is smart enough to place the original pitch on the proper key.

- **Important:** If the original key of a sample is on the wrong key, the sample will be out of tune. The original key selection field is always visible regardless of which tab is selected.

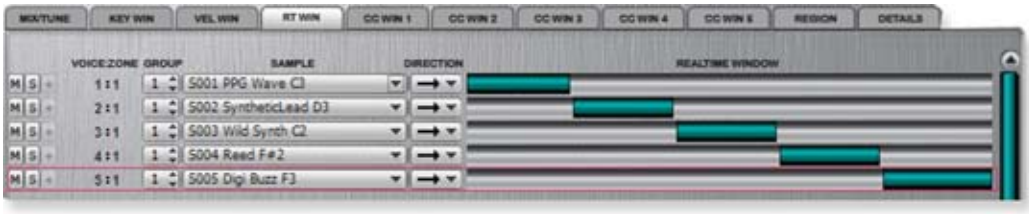
Original Key Selection

5. **Play the keyboard.** Since the sample is transposed over the entire keyboard range you can play it polyphonically at any pitch. But as you play in the upper part of the keyboard, notice that the sound doesn't sound so natural anymore. This is a result of the sample transposition. To overcome this problem we add more samples.
6. Select the next sample from the list in the Tree, then **drag and drop it** anywhere in the Key Win area as shown below.

7. A new voice appears in the window. Continue creating new voices using the rest of the samples by dragging and dropping them into the Key Win area.
8. **Play the keyboard.** Since the keyboard range encompasses the entire keyboard, you'll hear all the voices together.

Cross Switch the Voices.

9. **Select the RT WIN tab.** The Real-time control window lets you switch or fade voices according to the setting of a Control Knob, Envelope, LFO, or Function Generator.
10. Divide the range up for each of your voices more or less equally as shown below. Make sure the ranges do not overlap each other. Using the example below: Voice 1 = 0-25; Voice 2 = 26-50; Voice 3 = 51-75; Voice 4 = 76-100; Voice 5 = 101-127.



11. **Select Voice Processing** from the Tree. The Voice processing page appears.
12. Select All voices

using the group selector, located below the Envelope display. **This step is important** to ensure that you are editing all the voices.
13. Set up Cord 9 as shown with MIDI A connected to Amp Crossfade, with an amount of +100.

14. Now **play the keyboard while turning the knob** assigned to Controller A *(You do have your controller knobs assigned, don't you? If not, go to page 13.)* You'll hear the waves you assigned being switched as you turn the knob.

Transpose

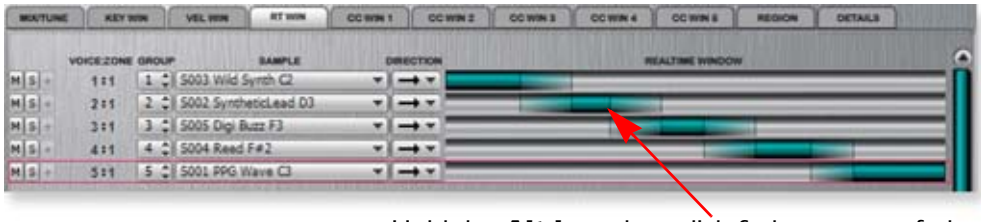
15. Are the pitches in the same octave? To transpose a single voice, select **just that voice**, then change the Transpose setting using the knob.

Automatic Control

16. Next we'll assign an LFO to control the cross-switch. Make sure all voices are selected, then set **LFO1 +** as the modulation source instead of **MIDI A**.
17. Now we have some timbrel animation going! Try out a different LFO rate and some other waveforms.
18. Now try assigning an Envelope Generator to control the cross-switch. Make sure all voices are still selected, then set **Aux Env +** as the modulation source.
19. Select the **Aux Env tab** and play with the Envelope settings. You can really twist the timbre around using an envelope or function generator as the control source.
20. **Turn Envelope Repeat On.** The Attack (1&2) and Decay (1&2) stages will continue to repeat as long as the key is held.

Crossfading

21. Next, let's crossfade the voices instead of abruptly switching them.
22. Hold the **Alt-key,** then **click and drag on the range bars** to effect a crossfade. You can also type into the RT numeric fields (lower right corner).



*Hold the **Alt key**, then click & drag to crossfade.*

23. Set your crossfade ranges as wide or narrow as you like. The example shown above works well, but you may like the sound better with longer crossfade ranges. Adjust the crossfades until the waves blend smoothly together as you turn the knob.

- **Important:** After adding the crossfades, you may have to deselect the Cord control of Amp Crossfade, reselect all voices, then re-connect the Cord.

Filtration

24. You have a fairly complex sound happening and you haven't even used the Filters or other Cords yet! Select the **4 Pole Highpass** filter and turn up the resonance a bit.

25. Turn up the **Envelope Amount** a bit. It's already patched for you on Cord 6.

26. Adjust the **Filter Envelope** to your own taste.

Add FX

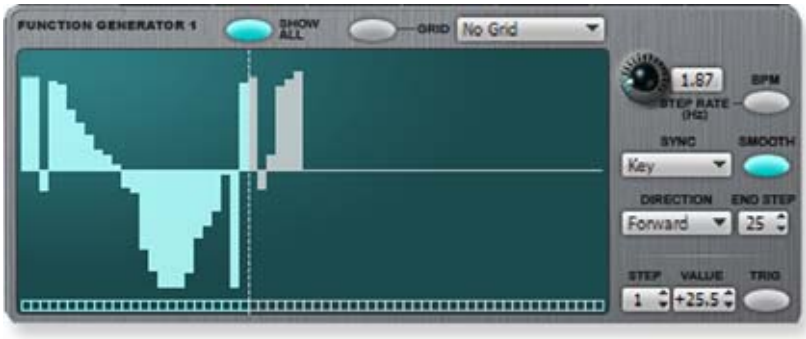
27. A little delay always works with synth sounds. Select the Preset Globals page by clicking the icon in the Tree. P000 New Preset

28. The **BPM Delay** is nice. Not too much, but with a little feedback. Ahhh!

Those Function Generators!

29. You might have already jumped ahead of us and tried the Function Generators. If not it's time to hook these bad boys up. As it turns out, the Function Generators are just about the perfect controller for crossfading.
30. Select **Function Generator 1 +** as the source for the Amp Crossfade.

31. Turn on the **Smooth** button and you can draw in the timbrel envelope with your mouse. Try out all the controls. You're there.



- **Something You Should Know:** Real-time crossfade is inherently wasteful of voices because all the voices in the stack are triggered on each key press. In this example, we're using 5 voices per key. This can eat up your available polyphony in a hurry.

▶ *Extra Bonus Tip: Rearranging the Order of Voices*

If you want to rearrange the order of your voices when cross-fading or cross-switching, this is probably the easiest way to do it.

1. Choose a new order for your voices, then set the Group number for each voice in the desired order as shown below.

Arrange Voice numbers in the desired order.

2. From the Preset menu, select **Sort Voices, By Group**. Now the voices are in the desired order from top to bottom, but the Real-time control ranges are wrong.

3. Unfortunately, there is no automatic way of setting the real-time ranges. You'll have to manually restore the range settings as they were before. The sorting operation makes this job easier and less prone to confusion.
4. Slowly switch through the voices with Controller A and listen. Do you like the order? If not, rearrange them again.

42 TwistaWave

Although TwistaLoop was designed for twisting audio phrases rather than single-cycle waves, there's no reason why we can't adapt the technology to create another synthesis method. Using this method we are able to re-shape the spectral components of a sampled wave.

Historically when a wave was sampled, it was like taking a single snapshot of the sound. Although you could apply filtering and volume shaping, the spectral evolution of the sound was pretty much fixed.

Using Emulator X, we can create multiple single-cycle loops, then wave sequence these loops using an envelope, LFO or Function Generator. This is similar to a motion picture where still pictures are sequenced to create a dynamically changing image.

▶ *Locate a Sample and Load it into the Bank*

1. Let's start with a clean slate. Select **New** from the **File** menu.
2. You'll get the best results by choosing a wave that has a fair amount harmonic evolution going on. We've chosen **Syncwave 1 C2** from the Proteus X Composer bank.
3. You can find this sample easily using the Library feature. Click the **Library** Tab at the bottom of the Tree.

- **Important:** If the Librarian doesn't find the samples, select **Update Library** from the **File** menu.

4. Type "**Syncwave"** in the 'Filter by Name' box, then click **Search**.
5. Select the **Syncwave 1 C2** sample and while holding the mouse button, drag and drop it on top of the Emulator X icon above the Tree.

6. Click the **Sampler** Tab at the bottom of the Tree, then double-click the **Samples Folder** to open it. You'll notice that the Syncwave 1 C2 sample has now been added to the Bank.

▶ *Placing the Sample on the Keyboard*

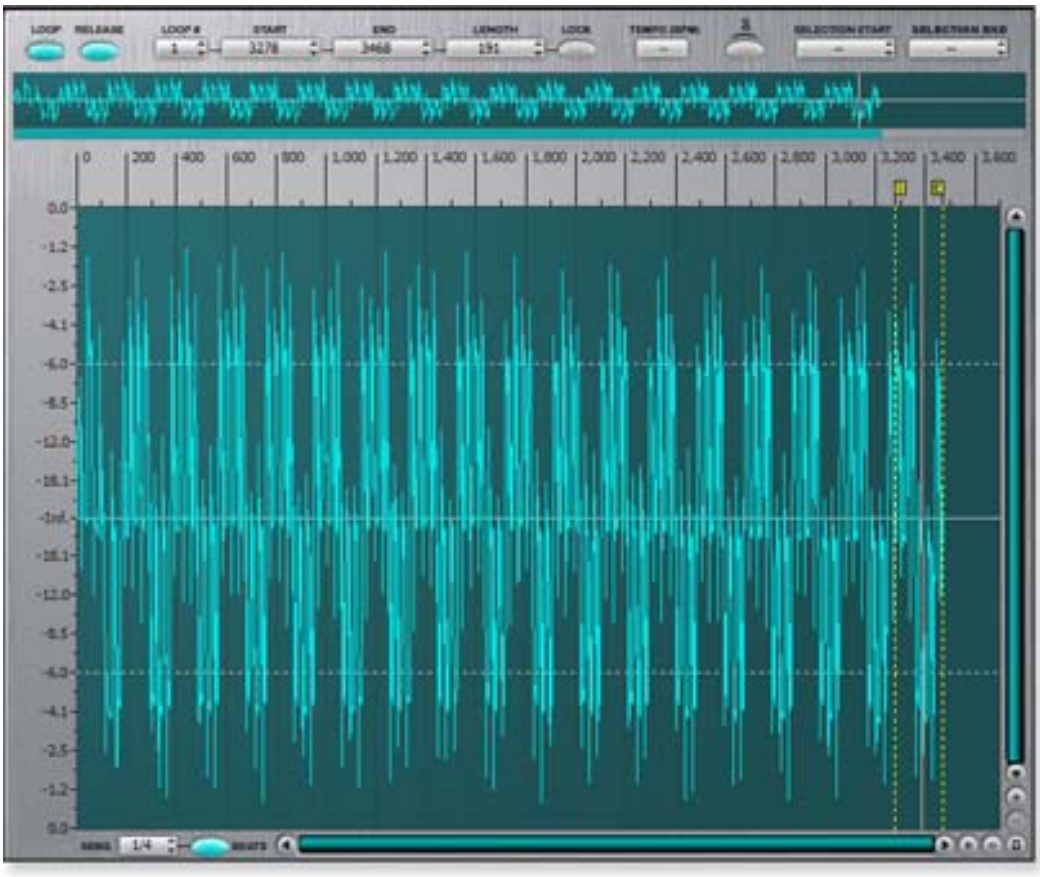
1. Click on the **Presets Folder** in the Tree, then select **New Preset** (Ctrl+W) from the Presets menu. A new preset appears in the Tree.
2. Select **Voices and Zones** in the new preset. The Voices and Zones page appears.

3. Select **Syncwave 1 C2** from the sample list in the Tree, then **drag and drop into** the empty sample area as shown below.

4. **Syncwave 1 C2** now appears in the sample field.
5. Play the keyboard. Since the sample is transposed over the entire keyboard range you can play it polyphonically at any pitch.

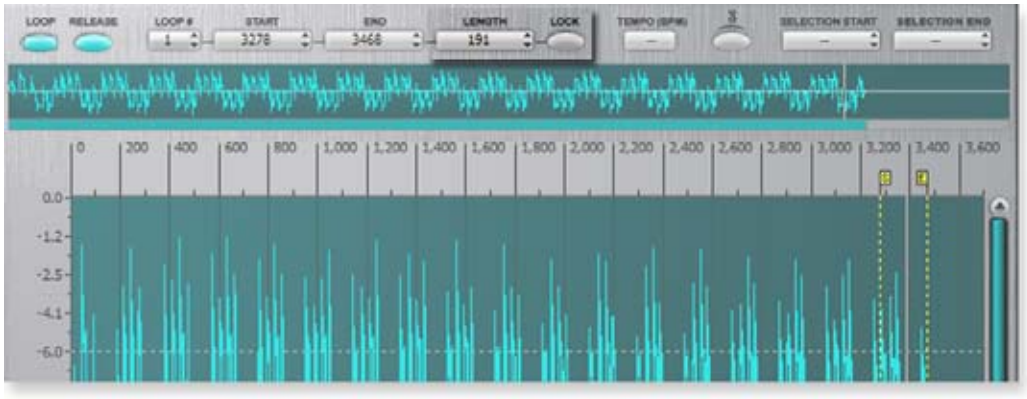
► *Creating Multiple Loops*

1. Double click on the **Syncwave 1 C2** name in the sample field. The Sample Edit window opens.

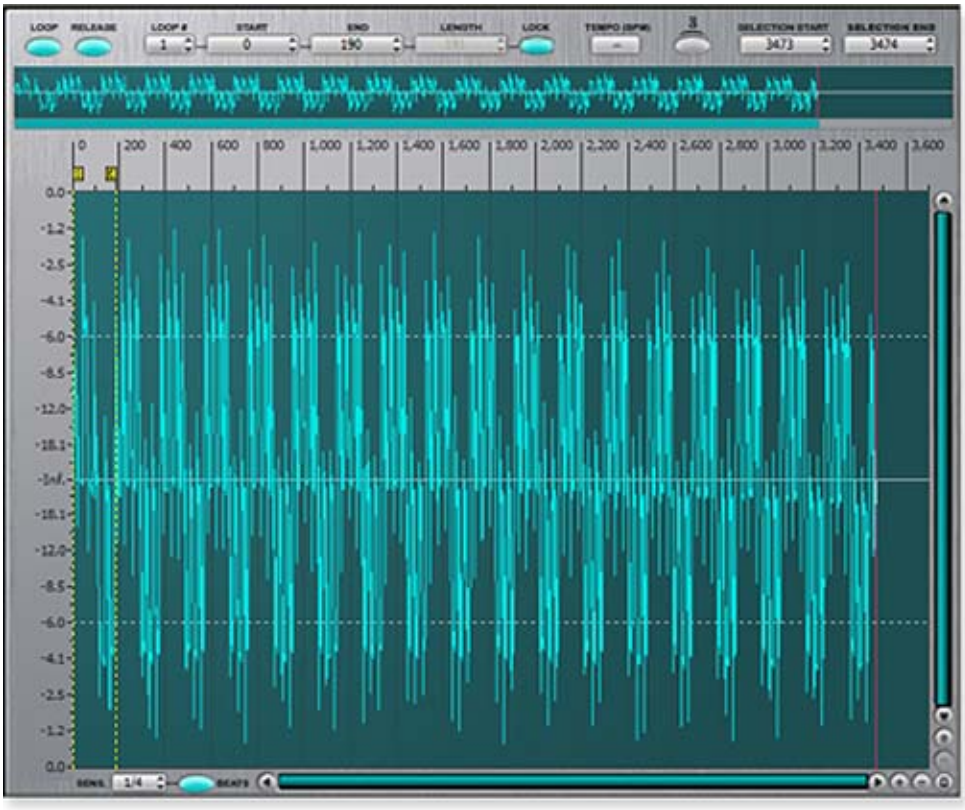


2. We've chosen this sample because it evolves harmonically over time and it already has a single-cycle loop. Single-cycle loops are perfectly tuned to the pitch of the sample. We're going to duplicate this loop several times, then scan through the loops using several kind of modulation sources.

3. Click the **Loop Length Lock button** shown below. This handy feature will keep the length of our single-cycle loop intact when we move it.

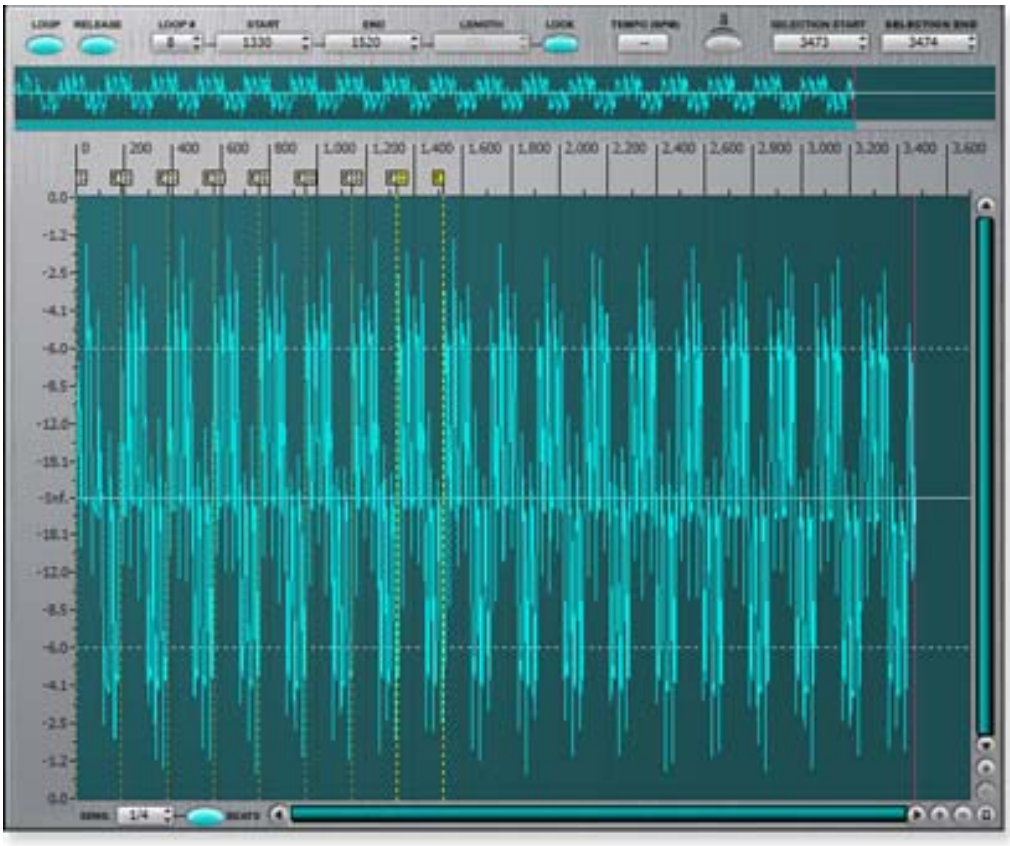


4. Note the start point of the loop (3278 samples). Keep a mental (or written) note of this number as we're going to use it later.
5. Grab one of the loop handles and **drag the loop all the way to the beginning** of the sample as shown below.



6. From the menu bar select **Sample Loop, Duplicate Loop** (Ctrl + Shift + D). Another loop appears immediately to the right of the first loop.
7. Press **Ctrl + Shift + D** again. The loop is duplicated again. Repeat this procedure until you have 8 loops.

8. The display should now look exactly like the screen shown below with loop number 8 selected (yellow).



9. Remember that number you were supposed to remember? You know, the start point of the first loop (3278 samples). **Highlight the Start Field** and **type the number 3278**. This restores the sustain loop from the original sample.

► *Connect the Modulation Source*

1. Select the **Voice Processing** page from the Tree.
2. Select **All Groups** from the Group selector below the envelope display.
3. Patchcord 9 is unused. Program the cord as shown at right with **LFO 1+** patched to **Loop Select (Jump)** and an **amount of +100.**

4. Select the **LFO/LAGS tab** and set the Frequency of LFO 1 to about **1.36 Hz**.
5. **Play the keyboard.** You'll hear the wave being sequenced by the LFO.

Smooth the Glitches

The wave sequence sounds cool, but you might also be hearing some slight glitching caused by the sudden amplitude discontinuities when the waves switch. This is a perfect job for a lowpass filter.

6. Select the **4 Pole Lowpass** filter. Turn the **Frequency** wheel down to about **300 Hz**.
7. The Filter Envelope is already connected to the Filter on Patchcord 6. Set **Cord 6 Amount to about +50.00**.
8. Select the **FILTER ENV tab**. Set the time of **Attack 1** to about **.3 seconds**.

9. Play the keyboard. Now the glitches should have disappeared. As long as we're here go ahead and adjust the filter parameters to your own taste.

Envelope Wave Modulation

10. Next try substituting the **Aux Envelope +** for the LFO by changing the cord source.

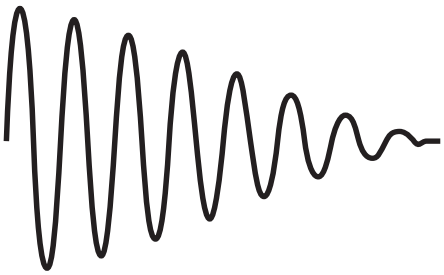
11. Select the **AUX ENV tab**. Adjust the envelope parameters until you get an interesting wave sequence going.

12. **Try turning Envelope Repeat On.** When the envelope repeat function is On, the Attack (1&2) and Decay (1&2) stages will continue to repeat as long as the key is held.

On Your Own

After you try the Function Generators choose some different waves. We chose this particular waveform because it was available to everyone reading this. Truly spectacular results can be obtained with waveforms that you sample yourself.

43 *Low Frequency Damped Sine Oscillator*



OK, we admit it. This programming example is completely esoteric and strictly for synth nerds. *(Whoops, that's us! Well, maybe you'll like it too.)* If you're feeling adventurous, try this technique as it may suggest other ideas for cool regenerative patches.

This trick creates a damped sine wave LFO using both Lag Processors and six Cords. Any sudden change in the control input will make the network "ring" with a variable decay time. The patch has a few practical uses as listed below, but more importantly it further demonstrates how the Patchcords can be connected to create entirely new forms and functions.

Applications:

- One-shot damped sine for creating "boing" sounds
- "Spring" panning or volume decay
- Pitch or mod wheel that overshoots the mark then settles down.
- Modify LFO waveforms
- Create chaotic or unstable control paths

▶ To Create a Damped Sine Wave:

1. Open any preset and open the **Voice Processing page**.
2. Select **All Voices** in the voice selector.
3. Find five unused Patchcords and program them in the order shown below.

Damped Sine Wave Patchcords

Source	Amount	Destination
Aux Env +	+100.00	Lag 1 In
Lag 1	+5.00	Pitch
Lag 2	-93.00	Lag 1 In
Lag 1 In	+100.00	Lag 2 In
Lag 1	+81.00	Lag 1 In

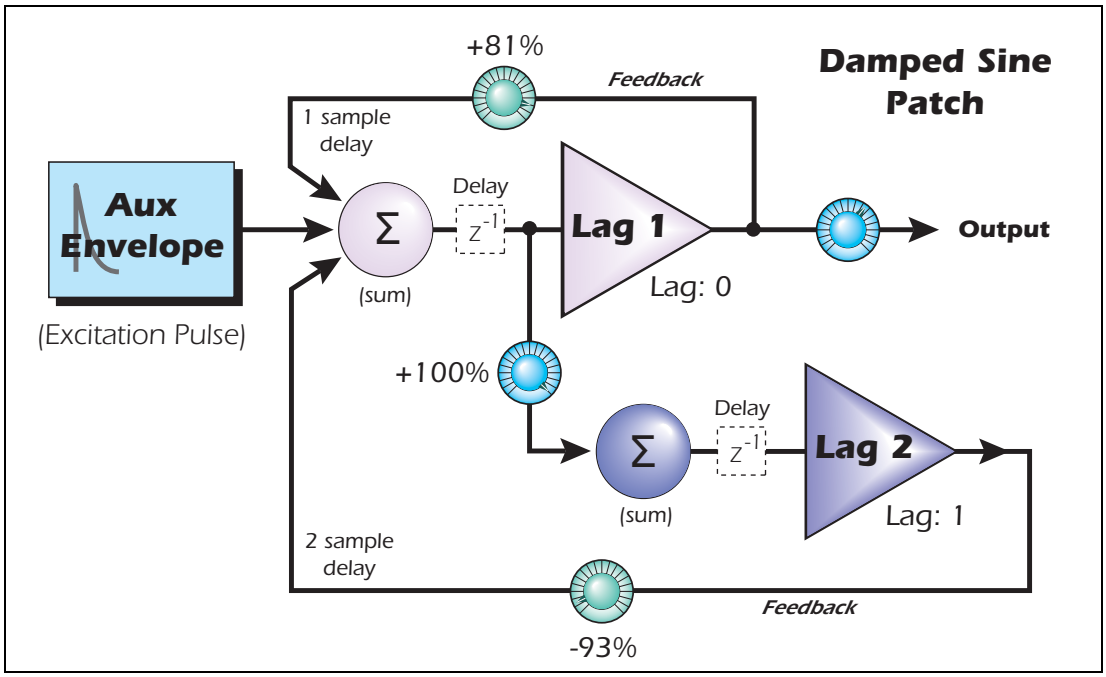
4. Set **Lag 1 = 1.00**; **Set Lag 2 = 0**
5. Set up the Aux Envelope generator to output a single pulse with a key press as shown below. This adds the energy to get the system going.

6. Play the keyboard. You should be hearing the pitch “boing” when you press a key.

▶ Brain Twister

The block diagram of the patch is shown below. Some of you may recognize this as a digital resonant lowpass filter. *(Not exactly, because of the low sample rate of the control loop, but the concept is the same.)* The short pulse from the Aux Envelope excites oscillation at the resonant frequency of the filter. The Summing nodes are part of the Lag Processors.

The control data through the Lag Processors is calculated once each control data loop. We are using this delay in combination with the two feedback paths to create the “filter”.



The Lag setting on Lag Processor 1 is used to smooth the waveform. The feedback amounts can be used to change the frequency and decay of the sine.

▶ More Experiments

After successfully getting the damped sine generator to work, you'll want to start experimenting. Changing the polarity of the Lag 2 output will cause the oscillations to become unstable, which can be quite interesting.

Two more possible mods are shown below. These were just discovered by experimentation to sound "good". You'll undoubtedly find your own gems if you poke around in the Patchcords.

Patch Mod #1

Patch Mod #2

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